

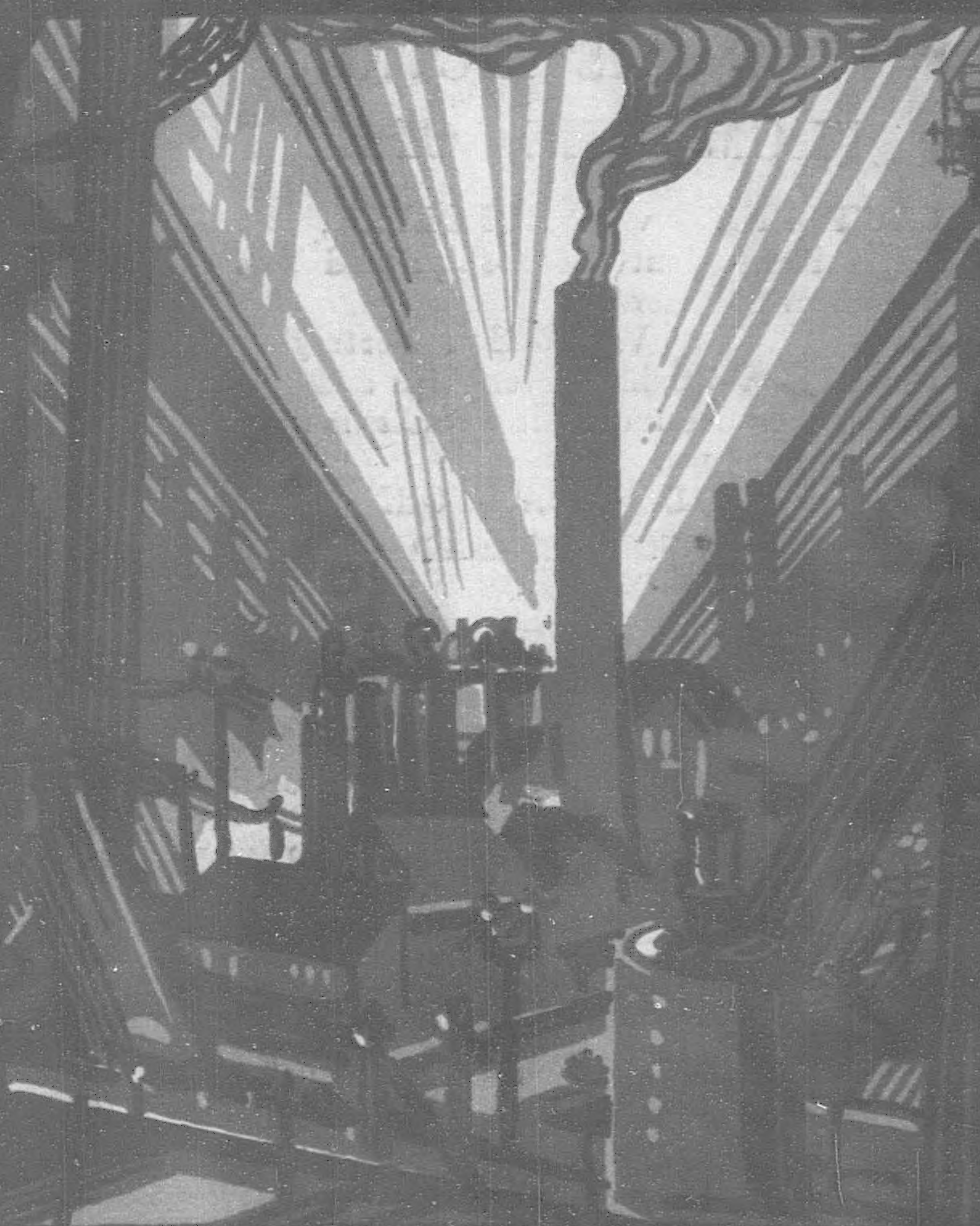
ENTERTAINING

FINANCE

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FAR EASTERN

REVIEW



A CLEAR CUT ISSUE
STAY OUT OF IT
WHO PAYS THE BILL?
CHINA, THE NEW WORLD POWER
BACK TO SLAVERY

上海黃浦灘分號

遠東時報

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No. 11

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The Far Eastern Review

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A Clear Cut Issue

WE are out of immediate touch with American opinion and incompetent perhaps to interpret faithfully the nation's reaction to our blundering diplomacy in co-operating with the League in the Sino-Japanese dispute. Intuition, however, tells us that we have made a grave mistake and are only beginning to realize it. The dispute itself, a localized affair which should have been settled between the interested parties was expanded overnight into a world problem by China's hysterical appeal to the League and world sympathy. Events in Manchuria were immediately overshadowed by the legal interpretation of the treaties and their application, while an unseemly rush on the part of our State Department to work with the League further complicated the situation.

As far as Americans are concerned, the whole Manchurian dispute is now relegated to the background before the greater issue precipitated by an Administration which in defiance of the emphatic mandate of the people expressed in the elections of 1920 and 1924 has deliberately involved us in dangers whose gravity for the moment can be only dimly discerned. The damage has been done. No explanation or withdrawal from our original position can now satisfy or calm the apprehension of the people of the United States.

The innocuous Kellogg Pact brought the United States into full partnership with the League, committing us to co-operate in enforcing its sanctions and decisions. We had no quarrel with Japan, yet we butted into her dispute with China and sent an official representative to sit on the Council of the League to strengthen its hands and assure it of our full and cordial support in asserting all the pressure within its competence toward regulating the action of China and Japan and supplementing this with the promise that the American Government will endeavor to reinforce its action, without waiting to know what that action might be.

What will it now profit us if after intervening in the Sino-Japanese dispute, incurring the resentment of Japan and acknowledging the League and all its works, if the League later on raises issues that will compel us to submit our own vital doctrines and treaties to its scrutiny and judgment? We are not playing the international game with a group of idealists, such as mould public opinion in our own country. Some of our playmates are hard-boiled and in deadly earnest, just as determined as we are when it comes to defending our own vital interests.

Japan especially, is in no mood to brook further outside interference in a region where her special interests have been acquired as the result of two disastrous wars. She has her own existence and destiny to work out and it bodes ill for the future of world peace and civilization if her people once get the idea firmly rooted in their mind that they alone are to be singled out for discrimination and penalized for defending themselves.

Japan is not a lawless or piratical invader in Manchuria. She has repeatedly declared that she will withdraw her troops and respect the territorial integrity of China as soon as direct negotiations have induced China to recognize and respect the treaties. Japan does not even ask that China discharge her international obligations as a sovereign state and guarantee her

from the menace that looms just over the Mongolian border. Japan does not even question the right of Nanking to extend and exercise its jurisdiction over Manchuria and is making possible a unification of the country which could never be attained except by prolonged and disastrous civil wars, and the perpetuation of a tyranny that is now a stink in the nostrils of all decent men.

As long as the rights and liberties of the Chinese people are restored under a government of their own selection, even though it be hand-picked for them at the start by Japan, there is no difference between Japan's drastic performance in Manchuria and our own interventions in Nicaragua, Haiti, Santo Domingo and Cuba for the restoration of law and order and the establishment of responsible government. It may be that methods deemed legitimate by the American Government in enforcing its conception of the right

of self-defense are denied to Japan because of a reluctance on the part of other nations to recognize any regional doctrine she may set up for her own protection, such as Great Britain and ourselves have laid down and enforced at our convenience. Our attitude in this may be rigidly correct and in strict accord with treaties which impair Japan's liberty of independent action. But if we can apply one principle where our own interests are concerned and stand ready to fight at the drop of the hat in its defense, against the whole world if needs be, then treaties or no treaties, it is morally indefensible to deny to Japan that same privilege and the discretion of using it.

Japan may be going the wrong way about achieving her purpose but the provocation has been great. For her to surrender her right of self defense to the League at this juncture and with-

THE ISSUE

Secretary of State Hughes to the League:

"As the United States has decided not to become a member of the League of Nations, this Government cannot act as though it were a member."

Secretary of State Stimson to the League:

"The Covenant of the League of Nations provides permanent and already tested machinery for handling disputes" such as that between China and Japan. "It is most desirable, that the League in no way relax its vigilance and in no way fail to assert all the pressure and authority within its competence towards maintaining."

Moreover, "on its part, the American Government acting independently through its diplomatic representatives, will endeavor to reinforce what the League does..... By this course we avoid any danger of embarrassing the League in the course of which it is committed."

draw her troops into the railway zone at its behest, she might as well get out of Manchuria altogether and become an appanage of China. It is entirely too early to judge and condemn her for resorting to desperate measures to assure her strategic and economic security and free the people of Manchuria from the intolerable yoke of the merciless bandit oligarchy which for years has battered on their life blood and defied any attempt to bring them under the rule of the Central Government.

The population of Manchuria may be Chinese but they owe nothing to the rest of China. They emigrated by the millions from within the Wall to escape the starvation, misery, extortions and outrages of brutal military despots who enslaved them in the name of the Republic, only to fall into the clutches of another army of human hyenas who herded them as serfs on their vast Manchurian estates and presented them with nice highly-colored freshly-printed worthless paper notes in exchange for their crops, afterward explaining that their depreciation in value was due to the exchange manipulations of the Japanese banks. Nanking, with all its faults, the best government that China has had for years, has been powerless to save the people of Manchuria from the rule of its self-imposed tyrants. These people cannot be handed back to the tender mercies of the Chang dynasty for further outrage and exploitation. For better or worse, the people of Manchuria are facing a new future. What the people could not do for themselves; what Nanking was powerless to perform, has been done by Japan. Legalists, quibblers and mealy-mouthed pacifists may object, but if there is any Humanity left in the world, any sympathy for the down-trodden, the poor and lowly who cannot help themselves, then judgment should be suspended until Japan's good or bad faith is established. Had the League or the United States, that great champion of human rights and liberties, not been recreant to their ideals and derelict in their duties, Japan would not now be placed in the position of having to resort to extreme measures to defend herself and undertake a task that Civilization has declined to soil its hands with.

The Japanese may not be able to express themselves as clearly as the Chinese; at the outset their case may have been badly presented from a Western viewpoint, but their diplomacy is as deep and smooth as that of European past-masters of the art. When Japan withdrew her objections to the presence of an American observer sitting in the Council of the League and consented to the mediation of that body with the United States in it, she created a precedent that will have far-reaching effects upon all future international disputes. All the great powers, including the United States, who reserve to themselves special rights in certain spheres will be obliged to submit their future interventions to outside scrutiny. A precedent has been established in Geneva that will justify outside intervention in any future situation involving the defense of our own rights in Cuba, Nicaragua, Panama or even in the Philippines. There are other places where the instability of government and forces of disorder may require American intervention. Great Britain has the same problems in Egypt, Iraq, India and other "certain regions," which concern only herself. The Kellogg Pact or the League has not released either nation from their self-imposed duties.

Mexico is expelling all Chinese from the country. China at first requested the United States to use its friendly offices with Mexico, and we declined to intervene. China is now preparing to appeal to the League for justice. If the case goes before the League and it finds Mexico is wrong and it becomes necessary to apply sanctions to enforce its decrees, it must override Article 21 of the Covenant and ignore the Monroe Doctrine. Or, the United States must go to war with Mexico in behalf of China to defend its vital doctrine and oppose outside interference in the affairs of the Western Hemisphere.

Once China is assured that the League will fight her battles, there will be no end to her demands for justice and equality. If, as it now seems likely, we will live up to our own pledges and concede independence in the near future to the Filipinos without strings or even if we tie her to us with some variation of the Platt Amendment, we will be in for no end of trouble with China.

Let us go back to that dramatic midnight session of the league commission in Paris on April 11, 1919, when President Wilson after an impassioned speech upholding our right to apply the Monroe Doctrine, declared the amendment carried by a majority vote. When the Japanese afterwards brought up the racial

equality amendment and it was carried by a majority, Wilson veered around and considered that unanimity was necessary and declared the amendment lost. The adoption of the amendment making Geneva the seat of the League was afterwards passed by a majority against the wishes of Belgium. The rule of unanimity was then embodied in the League Covenant and has since ruled its decisions until the vital interests of Japan again came under consideration when majority rule was applied over the protest of Japan to permit the United States, a non-member state, to sit in the Council of the League and co-operate in any pressure it might assert to enforce its decisions.

If unanimity is to apply in all future decisions, Japan will be justified in demanding an explanation as to why the exception was made in a case which affected her particular interests. If, on the other hand, the League adheres to the majority rule, it silently lays a wreath on its own coffin. For, it is obvious that a decision with a bare majority of one vote would be sufficient to overrule in the Council. The danger of such a rule, especially to the vital interests of the United States, does not have to be stressed.

What is Japan to think? How can we expect her to respect a body which does not know its own mind, refusing to abide by its own rules and reversing itself every time her special interests come before it for examination? Such procedure has only one definition. It is cold, calculated discrimination, a gross miscarriage of justice and good-faith. If that is the way the League plays fast and loose with Japan, how can it expect complete loyalty and submission to its decrees by other self-respecting nations?

But that is not all. Japan finally withdrew her objection to American co-operation and in doing so, put the skids under us so skilfully that we are plunged head foremost into the League in a way that is liable to complete the wreck of that organization and carry down to defeat the Republican party. *Japan's open and friendly gesture now makes it impossible for the United States to keep out of any future world controversy without showing discrimination.* We walked right into the trap and cannot get out without leaving our tail behind us. Japan has turned the table on us. If Japan now rejects any interference of the League in her actions in Manchuria, is the United States to continue to insist upon co-operating in any decision it may take to enforce its authority?

For the past two years, *The Far Eastern Review*, like a voice crying in the wilderness, has emphasized time and again, that chaotic China would in the end drag first her neighbor and then the rest of the world down to ruin. Every student of Far Eastern affairs knew that China would never retreat from her declared policy at the Washington Conference to ignore the validity of the 1915 Treaty or confront Japan alone in any settlement of her disputes with that Power. Yet the League representatives, reinforced by the United States, were led by the hysterical outburst of China into a situation where they now face the collapse of the League or the enforcement of its covenant by another world war. China has repeatedly refused to be bound by any treaties which do not operate in her favor, and the outside powers have condoned her offense. Not until the existence of Japan was menaced and she broke through the restraint of treaties to enforce China to respect the treaties, did the other interested Powers wake up to the gravity of the situation, and then only to consider the consequences and ignore the causes.

The Administration has worse than blundered. The next Congress will convene in a few weeks and unless all signs fail the President and Secretary of State will be called upon to explain this amazing affront to the American electorate. If a secretary of state can openly defy the deliberately expressed mandate of the nation and get away with it, it means the end of popular government in the United States. Americans may as well stop throwing stones at the War Department of Japan for taking the initiative of safeguarding national security in Manchuria away from the Ministry of Foreign Affairs and even take their hats off to the sturdy old Chinese war-lords who know what they want and take it. If our liberties and rights so emphatically asserted by the nation are to be surrendered by the first internationally-minded executive, let us by all means have a real he-American Dictator and be done with it. The Political issue confronting the nation next year seems clear cut.—G.B.R.

Stay Out of it!

By GEO. BRONSON REA.

GEORGE WASHINGTON may live in the hearts of Americans as the Father of his Country, but the spirit of Woodrow Wilson guides their destinies. What a pity Wilson did not live ten years longer to witness the triumph of his purely personal policies now proclaimed as the supreme law of mankind by the same political group that defied, defeated and nailed him to the cross twelve years ago.

From now on, the good old, hundred percent stalwart American gives way to the hybrid internationalist. The soldier, pioneer and adventurer who endured hardship and privation and won the West from the savage, wrested an empire from Mexico and fought to expand the nation and preserve its heritage, is torn down from his pedestal and his place usurped by the college professor, the dilettante in diplomacy and the idealist and sentimentalist who believe that slogans, phrases and dialectics will safeguard our future and usher in the millenium.

The unpretentious hallowed tomb at Mt. Vernon is no longer the shrine of American patriotism. On the other bank of the Potomac within the rising walls of a great cathedral (the Westminster of our future great) rests the mortal remains of the man who becomes the patron saint of a pacifist people: the Messiah of a new world dispensation. We tried, sentenced and crucified him a short decade ago for "*talking like Jesus Christ and acting like Lloyd George*." To-day he enters triumphantly into his kingdom. A Republican Administration has stolen his glory, and is sneaking in through the side door of the international show at Geneva in order to attract some of the limelight that too long has been monopolized by second rate performers substituting for the peerless American for whom the stellar rôle was created.

How U. S. Entered the League

Our befuddled diplomats, avaricious bankers, officious busy-bodies and the general run of professional pacifists, idealists and whatnot, have succeeded at last in manoeuvring the United States into the League of Nations as a sort of privileged ex-officio member, not bound by the prescribed rules of the game when it touches our own vital policies, but permitting us free scope to meddle in the affairs of other nations and to be the catspaw for Europe when they need us to rake their chestnuts out of the fire. Our furtive entrance into the League was a logical corollary to sponsoring the proposal of the French apostle of peace, who in turn, was inspired by an American college professor upon whose shoulders has fallen the mantle of Wilson and who stands to-day as the most ardent and indefatigable protagonist of the League in the United States. Professor Shotwell, the disciple of Woodrow Wilson, formulated the idea of renouncing war as an instrument of national policy and influenced Briand to frame a message to the American people that constrained our State Department to enter into diplomatic negotiations. As a sop to American vanity it is now called the Kellogg Pact, entailing upon our government responsibility for its enforcement. American peace organizations with immense financial endowments, working in harmony with the League and European diplomacy, forced through the Briand-Kellogg Pact, an instrument that allies us with the League and compels us to uphold the covenant where sanctions are applied to preserve the peace of the world.

We have also joined the World Court, a political machine where racial sympathies, selfish political interests and deep-rooted prejudice overrides principles and abstract justice in the settlement of purely domestic legislation of member states and whose most recent decision against the Austro-German customs union, bodes ill for the preservation of our own conception of sovereign rights. We are now in the League with both feet and at the rate we are progressing it will not be long before we are in over our head, sucked down in the mire of international jealousies, hatreds and self interests.

For nearly one hundred and fifty years, by minding our own business and adhering faithfully to Washington's farewell warning

to keep America free from foreign entanglements, our country grew strong, self-reliant, self-sufficient and immensely prosperous. We were forced into the World War—or rather, drifted into it stern first for lack of a resolute leader—in order to defend our neutral rights flagrantly set at naught by both the Central and Allied Powers. We are now being urged to pay for this war and in some way, shape or form, we will eventually do it. Then we will be called upon by our Associates to disgorge an indemnity for our tardiness in getting into the fray. Once they get us firmly into the League, subject to its jurisdiction and the decisions of the Permanent Court of International Justice, just so sure as God made little apples, we will pay in treasure or in impairment of sovereignty or security for our stupidity. We are paying and will continue to pay for our unpreparedness in 1917. Our billions, loaned generously and at a low rate of interest to post-war Europe for rehabilitation have been expended in preparations for the next war. We have financed Germany to the tune of over three billions of dollars which has enabled her to pay reparations to our war-Associates who in turn have paid them back in settlement of their debt to us. When we stop lending, the circle is broken; the house of credits collapses and we get nothing back. Only by throwing good money after bad, can we postpone the inevitable debacle.

Not satisfied with the lessons of the last fifteen years our statesmen of the Wilsonian school have defied the will of the people and entered into an adventure that may well terminate by another concerted raid on our prosperity disguised under the application of the League's sanctions upon Japan.

Japan Becomes the Victim

America, has been propagandized by pacifists, college professors, international meddlers and philanthropic debt cancellers into a belief that the nations of Europe look to us for moral and financial leadership in order to save Civilization from going under. We swallow the bait, hook, line and sinker. Japan, goaded into desperation by China's repeated violations of treaties and agreements, slowly strangling as the noose around her neck is drawn tighter and tighter, makes a supreme effort to free herself and preserve her existence. The League of Nations, which since its birth has studiously ignored the gravity of Far Eastern problems, is stirred into action by the hysterical appeal of China and without knowledge of the vital issues concerned, gives another yank at the rope around Japan's neck, and invites the United States to take hold and share a responsibility it dares not face alone.

The third paragraph of Article 3, of the League Covenant says: "*The Assembly may deal at its meetings with any matter within the sphere of action of the League or affecting the peace of the world.*"

If this means anything at all, it means that the League has the right to intervene in matters which affect world peace and that such action can be taken while there is yet time to prevent a conflagration. No revolutionary movement, no internal conflict of any magnitude can fail to affect the peace of the world, yet the League has made no effort to intervene in the interminable bandit wars in China, either on political or humanitarian grounds or to eliminate or control the causes which any school boy could foresee would compel some single Power to intervene to protect its rights. With the lessons of history before it, the League has cravenly shirked its duty in refusing to take the initiative to compel China to put her house in order and discharge her international obligations. The contention that no outside intervention can be tolerated in the domestic affairs of a member state may well apply when that state is so organized as to reflect popular opinion, and the government is subject to the will of the people, but, when a member state is in chaos, without a government that can discharge its internal or external obligations, where all authority is concentrated in the hands of bandit generals and the people are slaves, held in subjection at the point of the bayonet, denied the liberty of

speech and the right to participate in the conduct of their own affairs, the rest of the world must in self-defense take some action to counteract this menace to its peace and well-being. If the League is a real instrument for the preservation of world peace, it has a duty to perform in China.

The French Revolution which was wholly the concern of the French people at the beginning, affected the peace of the world to such an extent that it brought on a world war which lasted twenty-five years. The American Civil War affected the peace of the world to the extent that the imperialists of France seized on the opportunity to invade and set up a new empire in Mexico. Only when our hands were free did this empire perish.

What Russia is Doing

Does not the Russian Revolution affect the peace of the world? Taking advantage of the civil wars of China and the impotence of the League to impose restraint, Moscow amputated Mongolia from the main body of China and incorporated it in her far-flung system of Soviet Republics, closing it to foreign trade, travel and residence. Are not the Red armies safely hidden away in the wastes of this vast closed territory? The Mongol hordes led by Soviet officers are trained to a gnat's eyebrow and ready to move at a moment's notice. Sinkiang (Chinese Turkestan) is slipping automatically into the Soviet sphere. The Barga Mongols are demanding their independence in order to set up as another Soviet state. The Communists have overrun Central China. After a "bandit" suppression campaign lasting nearly a year conducted by the flower of the Nationalist armies under the direct command of their Generalissimo and his Minister of War, and in which over 200,000 deluded Chinese farmers were massacred, a Soviet Republic has been proclaimed in Kiangsi Province! Hunan, Hupeh, Fukien, Kwangtung and parts of North China are honey-combed with Communist cells. Any relaxation of vigilance along the Chekiang borders will bring the Red hordes swarming into the Delta region. Should Hangchow fall, Shanghai will be at their mercy. A Chinese plenipotentiary heading a formidable mission has been sitting in Moscow for nearly a year, ostensibly negotiating a settlement of the Chinese Eastern Railway dispute of two years ago. This unwieldy mission is being constantly enlarged but after twenty odd conferences with the Soviet Foreign Commissar, they are just where they started. Are we to believe the reports that come from Moscow that this big Chinese mission is being kept there until it is fully inoculated with Soviet principles? When the rest of the world wakes up to what is going on, it will be too late. China will go Red and the League of Nations by its stubborn refusal to face the realities of the Far Eastern situation and take action to preserve the peace of the world, will be responsible for the consequences.

The Polish Republic was forced to accept and agree to embody in a treaty with the principal Allied and Associated Powers the provisions deemed necessary by said Powers to protect the interests of inhabitants of Poland who differ from the majority of the population in race, language or religion. If the League can interfere in the affairs of Poland and other states in the interests of a religious minority, and devise international laws for the regulation of health, labor, communications and transit, economic and technical matters, reduction of armaments, sanctions, security, social and humanitarian questions, such as traffic in opium and other dangerous drugs, traffic in women, protection of children, refugees, abolition of the slave trade and almost every other question under the sun which affects human relations, why in the name of all that is holy, cannot it extend its power along still broader humanitarian lines to protect the lives and rights of millions of defenseless human beings, martyred, enslaved, outraged, starved, robbed, degraded and slaughtered by the millions in order that a merciless bandit oligarchy may continue to usurp the power of government and defy the laws of civilization?

The Job the League Overlooks

Why has the League refrained from taking action under its Covenant to intervene in a situation where every dictate of humanity and justice shrieks for its attention? Is the League afraid to exert its influence upon China? Is it more concerned for its own existence and the perpetuation of its machinery than in the elimination of causes which make for war? Why was China per-

mitted to retain membership in the League after it became increasingly evident that its government exercises no real authority and has defaulted annually on its contributions until its arrears are now over £360,000? Why should a state which is a persistent defaulter not be disqualified from election to chairmanships, or to the Council or even disqualified from voting altogether? Why are sanctions not enforced to compel such states to meet their obligations? Is the League, like the United States, to degenerate into an eleemosynary institution where China is concerned? Mr. C. Howard-Ellis in his recent book on "The Origin, Structure and Working of the League of Nations," tells us that in the case of China the reason for this leniency is obvious, explaining the obvious as follows:—

"The Chinese, too, threatened to leave the League unless they could get a seat on the Council, and in a choice between two evils—namely, of having a Chinese representative on the Council who did not represent a government with any authority in China, or having that government create an exceedingly difficult situation for the future by giving notice of withdrawal—the Assembly chose what seemed to be the lesser."

Yet, with her dues long in arrears; with a government existing in name only; exercising no authority outside three coastal provinces; incapable of enforcing law and order; of protecting lives and properties or discharging the rudimentary duties of a state; flouting its treaty obligations; maintaining useless armies that out-number the forces of all the other countries of the world; unable or unwilling to pay its just debts because every cent that can be begged or borrowed from the banks or stolen or squeezed from the people goes to defray the cost of maintaining the armies that keep the people in subjection: China has intimidated the League into retaining its membership.

What is China but a medieval Europe; a loose grouping of twenty odd discordant, hostile and irreconcilable feudal despotisms subdivided into countless petty semi-independent baronies, bandit domains and pirate reaches, the whole overrun by free-lance condottiere and hunger-mad mobs all fiercely engaged in preying upon and fighting each other? Over this picture of the Dark Ages looms the shadow of the Soviet, with the Banner of the Hammer and Sickle already firmly planted over vast regions in the north and fluttering in the breezes that sweep over the Yangtze.

Nowhere is there any unity, recognition of central authority or the semblance of modern state. The only sentiment that binds the warring groups together in even temporary unification is an overwhelming antipathy to the "outer barbarian" and a still deeper hatred of the despised "dwarfs" that inhabit the islands across the Yellow Sea. The only function of a modern state they recognize is the Waichiaopu, (Ministry of Foreign Affairs) a subordinate bureau whose sole usefulness is to play one outside nation against the other and at all costs prevent foreign intervention in the brawls of the war-lords. The direction of this bureau, dependent for its upkeep upon the generosity of the faction temporarily recognized by the foreign governments as the central authority, is gladly handed over by the unlettered military to a small group of returned students, the modernized classical scholar equipped with a Western education. These men, the hope of the future, represent all there is to national unity and patriotism and through their efforts China to-day is recognized and accepted into the family of modern nations.

China Becomes a World Power

Under the old order of things, the scholar ruled the land and the soldier was despised. The old social values are now reversed with the soldier on top and the scholar picking up the crumbs that fall from his table. After the army, his harem and his pleasures are provided for, the military overlord may dole out a little charity to keep together the bodies and souls of his faithful literatii. This explains why China is in arrears to the League, yet the complaisant and timorous Assembly funkling its obligations, has elected this hold-over from the Dark Ages to the coveted seat on its Council and given to its representative a full voice and vote in deciding the affairs of an organized world and the right to make laws for the guidance of free and sovereign peoples which she will never consent to be enforced in her own country. The military despotism and bandit oligarchy that rules China is now part of the accepted machinery of world order, with its professional

western-educated apologists sitting in the Council of the League on a plane of full equality with the representatives of other free and advanced states!

The world is now getting at first hand a typical example of how warfare has been conducted in China from time immemorial. The Battle of Geneva is simply the battle of the war-lords transferred to the world stage and in such a war of words, insults, accusations and classic invective, there is no doubt as to which side will emerge victorious. Hysterical, emotional, and with an utter disregard for the conventions, the Chinese, protected by the League, are demanding the application of sanctions against Japan. "Sever diplomatic relations! Bring economic pressure to bear! Use force! Send armies to protect the peace of the world! The future of civilization is at stake! If the armies of the League are not dispatched to enforce the Covenant, the forces of China will take the war path and drench the Far East in blood!"

And the Administration at Washington committed under the Kellogg Pact to co-operate with Geneva, hastens to accept its invitation to sit in its councils and assume joint responsibility for such action as may be taken to put Japan in her place. Like a mouse smelling around a rich old cheesy bait, we are caught in the trap. We are now in the League against the wishes of the country and the declared policy of Congress. We have been out-foxed and betrayed, and if the League is permitted to have its way we will pay the piper for any action it may vote to take against Japan.

Eleven years ago, this magazine departed from its established policy, because at that time we had accurate information of the plot to embroil the United States in a war with Japan over China. There was one phase to this conspiracy that was generally overlooked. The United States and Japan were the only two nations that came out of the World War with profit. If these two nations could be tobogganed into a war after the termination of the world struggle, their wealth would have rolled back to where it came from; Japan and the United States would have been impoverished; American commerce in the Pacific destroyed and Japan set back for a generation. The development of China and the market offered by four hundred millions of purchasers would automatically be handed over to Europe. How near we came at that time to being the dupe of these international plotters, is appreciated only by a very small group. But we side-stepped the trap and our hand-picked "enemy" has since become our great friend, our best customer, linked to us by such close ties of finance and commerce that they arouse the envy of our competitors.

American investors have absorbed nearly five hundred million dollars of Japanese bonds. Japan has never defaulted. Nearly forty per cent of Japan's trade is with the United States. Japan is our best customer in Asia, the largest purchaser of our raw cotton. In direct exports of American goods and in raw and half finished American materials manufactured into finished products in her mills and factories, Japan sells more of our goods to China than all the American firms engaged in business in this country. Should the League, with the support of the United States, decide to apply economic pressure upon Japan to compel acceptance of the League's advice, who would suffer?

And America Pays the Bill

Apply economic pressure upon Japan, stop her trade, close the ports of the world to her ships and the result will be that the good natured American sucker will pay the bill. What could not be accomplished ten years ago by direct hostilities can now be brought about by the more innocent looking weapon of the League. The enforcement of a boycott would require blockades and if attempted seriously in the Far East, it would develop into open warfare. "A boycott," said Senator Lodge in a speech denouncing the League, "is simply an effort to starve a people into submission, to ruin their trade, and in the case of nations that are not self-supporting, to cut off their food supply. The misery and suffering caused by such a measure may easily rival that caused by actual war".

Are Americans to be lured by professional pacifists and misguided League enthusiasts into an economic war with Japan that must be paid for by a loss of our investments and trade and the humiliation and ruin of a nation whose only offense, if offense it may be, is to apply for its preservation the identical principles of self defense which underlie our own vital doctrine of security

and the provisions of the Kellogg Pact? Are we to walk with our eyes open into a situation that once more will shoulder upon our investors and tax-payers the cost of a war in which we have no concern? If we should declare war upon Japan in concert with the League, for that is exactly what the boycott means, we may ruin her temporarily, but after she is exhausted and lies prostrate, will we not be the first to lend our millions for her rehabilitation? If we join in declaring an economic war upon Japan, would she not be fully justified in repudiating her obligations to us? It has cost us to date, over three billions to put post-war Germany on her industrial feet. How much will it cost us to rehabilitate Japan to the point where she will again be our best customer in Asia, able to resume payments on her debts to us?

In the meantime, while Japan is being coerced and ruined economically, she will lose the markets in India, Africa, the Near East and South America, so laboriously built up during the last decade. They will be taken over by our competitors in Europe and when the adventure in pacifist diplomacy is all over, we will be left holding the bag, while our fellow philanthropists in the League will hold on to their gains and chuckle over our simplicity.

For ten years, *The Far Eastern Review*, has fought to keep the United States out of this Manchurian mess. The American people do not understand what it is all about. It is emphatically none of our business. We have barred the Japanese out of the United States and gratuitously stigmatized them as undesirables. They are still smarting under the insult. The British have excluded them from Australia, New Zealand and South Africa. The Chinese want to exclude them from China Proper and drive them out of Manchuria. Where are they to go? Why should we follow them up in Manchuria and become a party in circumscribing their activities by building a ring fence around them? We know what our own country would do if it was ever placed with its back against a wall, fighting for its right to exist. We would tell the whole world in three concise words of one syllable where to go to. And, if we get into the League so that we cannot get out and accept the jurisdiction of the Court of International Justice, the day will surely come when we will have to tell the rest of the world to mind its own business while we settle our own affairs in our own way.

If there is one thing that will overthrow the Republican Party next year, it will be the surrender of a policy that has become almost the supreme law of the Land, a policy handed down by the Father of the Republic and under which it has achieved greatness and unprecedented prosperity. This policy was challenged and set aside by a self-centered college professor, a maker of phrases who defied the constitution and traditions of his country in order to set himself up as the Ruler of the World under a League of his own creation. It has become the fashion to denounce and damn the militarists for their ambitions, but no leader of conquering armies in the whole history of the world ever aspired to the supreme rôle that this apostle of pacifism attempted to create for himself out of the wreck of Europe. "He had as great an opportunity as was ever given in human history to one man." He threw it away because he was constitutionally unable to accept any viewpoint other than his own. The world may be in danger from future Napoleons, but it will be nothing compared to its enslavement when the law of reason is universally applied and the gift of gab decides the fate of nations. The Dictator of the Universe will then be either an American pedagog, a Chinese scholar or a Bengali Babu.

Wilson has gone but his spirit lives. His disciples are many and they are carrying on. They may be right. The enforcement of the League Covenant and the Kellogg Pact in a world that is still an armed camp is more liable to promote war instead of peace. America's sole concern in the Manchurian dispute is to uphold the Kellogg Pact and lend our efforts towards conciliation and a peaceful settlement. The Kellogg Pact is a long step towards the attainment of an ideal a war-weary world has set its heart upon. We want the pact respected. We hope it will be respected but if it fails to operate, the fault lies in the treaty itself. Japan is well within her rights under the Pact to apply the law of self defense and no other nation can question or challenge her definition of this right. Washington is fully justified in taking a keen interest in the Manchurian dispute, but if we join forces with the League in order to exert pressure upon Japan, our incursion into

world politics may bring irreparable damage to both China and Japan and hand the domination of Asia over to the Soviet.

Forgotten Lessons of the Past

Let Americans remember that every time our government has meddled with Far Eastern problems we have unintentionally but nevertheless very effectively impaired Japan's power of self-defense. We did it in 1898, when John Hay promulgated the Open Door Doctrine with its recognition of China's sovereignty and guarantee of her territorial integrity at the precise time that China was a secret ally of Russia against Japan and had handed over Manchuria to Russia in order to carry out the terms of the alliance. Japan was bound hand and foot by her adherence to the Hay Doctrine while Russia and China were preparing to crush out her existence. Only by a tremendous sacrifice in blood and treasure did Japan save herself and China from passing under the yoke of the Muscovite.

Ignorant of the real issues at stake, we then tried to deprive her of the fruits of her victory by proposing to internationalize the Manchurian railways for the benefit of Harriman and when this plan was rejected, we obtained from China the Chinchow-Aigun concession to use as a lever to force Japan to sell the South Manchuria Railway.

We intervened in 1919 to compel Japan to pool her Taonan-Jehol railway rights in the Consortium which she was holding to defend herself and China against "the menace from the direction of Urga." In doing so, we deprived her of her outer line of defense against the advance of Soviet Russia and laid her open to the very menace she now finds herself in, with the Soviet-led Mongol armies flanking her position in South Manchuria while her hands are tied and she dares not move to defend herself without violating the treaties.

In 1921, at the Washington Conference we tore down her last bulwark against the menace of Russia by forcing the cancellation of the Anglo-Japanese Alliance. We then took upon ourselves the rôle of guardian of the rights of the Russian people, insisting that Japan withdraw her troops from Siberia. Japan complied and as she retired, the Soviet advanced. Laboring under the delusion that Russia would never again, at least for a generation, become a danger to the peace of the Far East, we compelled Japan to forego the opportunity to obtain sanctions that would have guaranteed her security. In doing so, we underestimated Russia's powers of recuperation and handed over to the Slav the domination of Asia.

We uttered no word of protest when Moscow incorporated Mongolia into the system of Soviet Republics. We know that it is now a closed preserve, where an American consul, accredited to China, is not permitted to enter. We know that the Mongols are organized and led by Soviet officers. We know that these armies flank Japan's position in South Manchuria and we also know that the movements of these armies are being screened by the Chinese border forces who arrest, turn back, imprison or execute any parties of Japanese seeking to penetrate the forbidden territory. We know that there exists a great Far Eastern Red Army based on Irkutsk and Chita and it is not necessary to be a military expert to sense that when this army moves, its advance will be screened from the world. The push will be to the south through Urga and in the direction of Peking, not eastwards through Manchuli and along the Chinese Eastern Railway, where it must encounter the formidable armies of Nippon. Moscow is telling the truth when it informs the world that it is not mobilizing its armies behind Manchuli. It doesn't have to. Its line of advance and power of offense lies in another direction.

Russia is not a member of the League. She is immune from invasion from without and impregnable in Central Asia, where she will do as she pleases when she pleases and thumb her nose at the rest of the world. China is facing extinction as a state, powerless to defend herself or discharge her duty towards Japan or the other nations whose interests are imperilled. Japan cannot openly stress the strategic problems that lie at the root of her Manchurian policy without precipitating an issue with the Soviet. The situation is one however that does not require explanation, nor is Japan committed to give one.

Two years hence, when the Trans-Siberian Railway is double-tracked and improved, when the net-work of feeder lines terminating along the Chinese border are completed and the huge steel

mills at Kuznetsk and Magnetogorsk are turning out their three and a half million tons of steel and munitions, the advance of the Soviet in Central and Eastern Asia can no longer be checked. If Manchuria is to be saved to China, nay, if China herself is to be saved from going Red, some interested power must act and act now, while there is yet time. The right of Japan to protect herself by preventing a condition of affairs in which it will be too late to protect herself, rises superior to every consideration or obligation she owes to other nations. So aside altogether from the violation and evasion of treaties and other acts on the part of China which determines Japan in moving to defend herself in Manchuria, is the greater and more ominous menace to her own and China's existence involved in the steady relentless advance of the Soviet in Mongolia and Sinkiang and the rapid spread of communism in the Yangtze Valley.

* * * *

Perhaps we are all wrong. We belong to a generation that is passing; the generation that built the trans-continental railways, that fought the Sioux, rounded up the Apaches, settled and reclaimed the wilderness and created a new Empire; a generation that took part in the opening of Oklahoma and the Cherokee strip, that filibustered in Cuba and Central America; fought the Spanish American war, the Boxer campaign and the Filipino insurrection. We saw the Maine blown up and watched while American history was being made at San Juan Hill and as Cervera gallantly steamed out of Santiago to certain destruction. We saw our country transformed over night into a first class power. To preserve and defend our new found greatness and guarantee our security and the right to work out our manifest destiny, we found a way to annex a strip of land across the Isthmus of Panama through which we could dig a canal to consolidate our gains. We knew what we wanted and fought for it or took it.

The generation of Americans which is fast disappearing, like their forbears who passed on before, has left a heritage to those who must carry on the traditions of the nation. That generation, schooled on the plains of the Far West and in the Spanish American war, produced the generals and captains that made possible those greater victories across the seas when the fate of the World was at stake. The youngsters who got their training in the World War, will also be true to their trust, and hold what has been handed on to them for safe keeping.

But what of the coming generation? America is no longer the great Land of Opportunity. As the pressure of an increasing population fills up the few remaining vacant spaces in our country and sends our children out over the seas or across the borders into Mexico and the bars are erected against our entrance; when we have handed their destinies over to the League of Nations; subjected them to the jurisdiction of a World Court, tied them hand and foot with war renunciation pacts and other instruments which fetter or deprive them of their right to self-defense and they are no longer permitted to make their own decisions in matters of world concern and domestic policy, the end will come to our experiment in government. The great republic that blazoned the way for the liberty of mankind will surrender its sovereignty and be absorbed in that greater international gabocracy where any combination of Asiatic states can rally enough votes with those of Latin America, to tear down the bulwarks we have erected for the perpetuation of our ideals and the maintenance of our security.

It may be that times have changed, that the philosopher, the pedagog and the pacifist will argue our future enemies into defeat and carry the nation to still higher peaks of greatness. It may be that fifty years from now, Memorial Day will be observed exclusively in the pretentious Pantheon which enshrines the remains of our Pacifist President while beautiful Arlington, the resting place of our glorious dead, will be overrun with weeds and desecrated as a mark of national condemnation of those stout-hearted, hard-fighting, hard-dying and yes, hard-drinking heroes whose exploits disgrace the new cult of prohibition and pacifism. The names of the soldier and all reference to his part in making American history will be expunged from the school books. The statues of our beloved warriors who gave their lives that we might live, will be torn down and supplanted by some horn-spectacled college professor, the leaders of the emasculated offspring of a once proud fighting race. Thank God! we won't be here to see it.

Who Pays the Bill?

"The United States Could Have no Better Nation than Japan for an Ally"

CHINA'S boycotts against Japanese goods, accompanied by beating loudly on the national tom-tom to terrorize and stampede the enemy into submission, are invariably acclaimed by onlookers as a most effective way of forcing Japan to accept the Chinese viewpoint. Chinese propaganda supporting this method of warfare, is based on the premise that Japan's economic existence is dependent upon the Chinese market and when this trade is cut off she faces financial ruin. Without stopping to analyze the trade returns, Americans are inclined to endorse the use of this weapon as the most peaceful method of settling international disputes, indirectly giving aid, comfort and encouragement to China to persist in her methods. At the end of the Great War Japan was largely dependent upon China for its markets, but this is no longer true. It is high time for Americans to wake up to the real situation and what it means to their own prosperity. They will now find that Japan's trade with all of China, including Manchuria and Hongkong is 20 per cent of the total and excluding Manchuria and Hongkong, only 13 per cent of the total.

The real vital factor in Japan's economic life is her trade with the United States (including the Philippines) which accounts for 44 per cent of her exports and 29 per cent of her imports, or 37 per cent of her total foreign trade.

Japan's exports to countries within the British Empire represent 18 per cent of the total while her imports from the same countries are 39 per cent, both representing 24 per cent of Japan's foreign trade. The United States, Great Britain and China therefore account for 81 per cent of Japan's trade, leaving 19 per cent scattered between all other countries.

When the little countries represented in the League of Nations, supported by the United States, decide that economic pressure must be brought to bear upon Japan because of her action in Manchuria, they have nothing to lose. The United States pays the bill. It is true that on the surface Great Britain would also suffer but an analysis of Japan's trade with the British Empire indicates that in any world-wide boycott of Japan, British manufacturers would capture her markets in these countries and equalize the loss in Empire exports to Japan. As the exports of Japan to British Empire markets are largely confined to cotton yarns and textiles, the Indian cotton farmer would become the goat for the rest of the empire, as the heaviest loss would fall on his shoulders. British textile mills may buy more American cotton for a while, but who will buy the short staple Indian cotton crop, when the Japanese market is closed? Here is something for the Mahatma to ponder over. If the Indian cotton farmer loses his market to Japan and the British mills do not take his product, it will give a decided impetus to Gandhi's program to have the Hindu people make their own homespun. The consequences of exerting the League's economic pressure upon Japan might have a more far-reaching and disastrous effect upon Britain's position in India than any temporary loss occasioned by a stoppage of Japan's trade with America. There is no need to labor the point. The figures speak for themselves.

But Americans are concerned not only in their direct trade with Japan but with Japan's trade with China. American exports

to China are about \$120,000,000 annually, of which approximately one half is in oil and tobacco, a trade exclusively in the hands of American firms. But a very large part of the other half, estimated to be from \$40,000,000 to \$50,000,000 goes through Japanese firms with offices in America who buy direct from the American manufacturer. If we add to these direct exports to China of American goods through Japanese firms, the value of American raw and half-finished materials exported to Japan and there manufactured into finished products for the Chinese market, it will add another \$50,000,000 to American trade with China, or an approximate total of \$100,000,000. "The United States could have no better nation for an ally," declared Assistant Secretary of State Castle at a recent speech in Boston.

The Japanese Government has outstanding foreign loans to the amount of Y. 1,446,848,812; Japanese Municipal Government loans to the amount of Y. 249,215,581, and private or industrial loans aggregating Y. 464,146,940 or a total of Y. 2,160,211,333. About half of this total is held by Americans while a large proportion of the bonds originally sold in Europe have gravitated into the hands of American investors.

If the League with the co-operation of the United States should apply Article 16 of the Covenant and impose economic sanctions upon Japan in response to China's invocation of this penalty and cut Japan off from the markets of the world, in other words, if we declare a Chinese war upon Japan for the sake of China, what becomes of the billion dollars in Japanese bonds held by the investors of America and Great Britain; bonds that to-day are one of the few gilt-edged investments left in this world of financial chaos? *Who pays the bill?*

Is the United States, co-operating with the League against the mandate of the nation, to sacrifice a trade of \$800,000,000 gold and an investment of \$500,000,000 in gilt-edged Japanese bonds for the sake of upholding a military despotism which refuses to pay its legitimate bills to American firms for materials delivered, defaults on and repudiates its loans, flouts its treaty obligations, robs and oppresses its own people and floods the country with billions of worthless paper notes and in every other way shows itself unworthy of respect and confidence?

Sympathy? Yes, the sympathy of every generous-hearted, right-thinking man goes out to China in her trials and tribulations but this sympathy can no longer be wasted on a group of predatory war-lords, but extended to the great masses of inarticulate Chinese people, the most patient, kindly, courteous, polite, gentle, peaceable, home-loving and law-abiding humans in the world, if given a little good government and the liberties and rights enjoyed by other peoples. For the United States in co-operation with the League to embark on an adventure to penalize Japan and incur the huge losses outlined above in order to fasten the yoke of serfdom upon the people of Manchuria for the sake of a group of ruthless bandit oppressors, is not only the height of imbecility but a betrayal of all those ideals we hold as most sacred and essential to human welfare and the progress of civilization.—G.B.R.

WHO PAYS THE BILL?

A Page for Americans to Study

JAPAN'S 1929 TRADE RETURNS

Japan's Total Exports	...	...	...	...	Y. 2,148,618,652
„ „ Imports	...	...	...	...	2,216,240,015
„ „ Trade	...	...	...	...	4,364,858,667

JAPAN'S TRADE WITH CHINA

(Excluding Kwantung Leased Territory and Hongkong)

Exports	...	...	...	...	Y. 346,652,450—16% of Total
Imports	...	...	...	...	209,974,056—9% „
Total	...	...	...	...	556,626,506—13% „

JAPAN'S TRADE WITH ALL CHINA

(Including Kwantung Leased Territory and Hongkong)

Exports	...	...	...	...	Y. 532,193,817
Imports	...	...	...	...	376,904,187
Total ...	...	...	...	...	909,098,004—20% of Total

JAPAN'S TRADE WITH THE UNITED STATES

(Including the Philippines)

Exports	...	...	...	...	Y. 994,629,301—44% of Total
Imports	...	...	...	...	672,099,519—29% „
Total ...	...	...	...	...	1,666,728,820—37% „

JAPAN'S TRADE WITH THE BRITISH EMPIRE

(Excluding Hongkong)

Exports	...	...	...	...	Y. 377,596,384—18% of Total
Imports	...	...	...	...	680,248,125—39% „
Total ...	...	...	...	...	1,057,844,509—24% „

JAPANESE FOREIGN LOANS OUTSTANDING

(March 31, 1930)

Japanese Imperial Government Loans	...	...	...	Y. 1,446,848,812
„ Municipal Government Loans	...	...	...	249,215,581
„ External Bank and Corporation Bonds	...	...	...	464,146,940

Y. 2,160,211,333

Exports	Countries	Imports
	ASIA	
346,652,450	China	209,974,056
124,476,203	Kwantung Province	166,322,386
198,056,968	British India	288,107,771
61,065,164	Hongkong	607,745
27,928,339	Straits Settlement	41,634,301
15,101,604	Asiatic Russia	22,874,960
2,695,403	French Indo-China	9,590,587
87,125,451	Dutch India	77,346,923
30,528,349	Philippine Islands	18,044,238
10,633,368	Siam	20,811,772
10,969,469	Other Countries	2,639,061
915,232,768	Total	857,953,800

EUROPE

63,183,354	Great Britain	153,050,779
44,494,959	France	26,185,050
13,446,619	Germany	157,273,913
6,108,543	Italy	7,550,053
2,890,329	Belgium	15,828,289
62,368	Austria	1,718,891
647,692	Switzerland	17,570,156
6,917,811	Netherland	5,462,420
2,303,819	Russia	3,080,902
366,355	Norway	4,680,956
864,661	Sweden	11,025,186
1,258,718	Spain	773,054
2,551,495	Turkey	202,337
1,033,754	Denmark	6,025,814
17,361	Portugal	717,629
13,691	Poland	5,487,136
14,594	Czechoslovakia	1,960,783
1,072,620	Other Countries	1,253,780
147,248,743	Total	419,847,128

AMERICA

914,101,952	United States of America	654,055,281
8,579,989	Argentina	3,235,889
27,078,648	Canada	68,729,648
1,342,794	Mexico	700,833
1,256,026	Cuba	758,197
2,601,545	Peru	58,896
2,719,199	Chile	10,414,733
1,572,006	Brazil	380,971
11,507,990	Other Countries	276,147
970,760,149	Total	738,610,595

ALL OTHER

44,075,090	Australia	132,600,701
13,179,323	Cape Colony and Natal	1,447,600
31,352,285	Egypt	25,824,061
6,271,077	Hawaii	145,967
4,094,662	New Zealand	677,325
16,404,555	Other Countries	20,442,556
115,376,992	Total	181,138,210

(UNKNOWN (Bonded Mfg. Warehouses)

2,148,618,652	Total	2,216,240,015
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Borah will Talk

By virtue of his office as chairman of the foreign relations committee of the United States senate, Mr. William E. Borah holds a commanding position in world politics and his public utterances are naturally interpreted abroad as reflecting the general policies of his government. He was one of the "Irreconcilables" who opposed and defeated our entrance into the League of Nations, which indicates that he is endowed with good common sense and sturdy Americanism. In this, he is right. But when he injects his private opinions into a Far Eastern dispute without a full knowledge of the issues involved, he is overstepping the conventions and doing his country an irreparable injury. Then Borah is wrong.

Inaugurating the William E. Borah Foundation for Outlawry of War at the University of Idaho, Senator Borah said that the Japanese Government has violated every international law including the Kellogg-Briand pacts, the League of Nations covenant and the Versailles treaty. *"Even though Japan's reasons were ten times as truthful as it can be assumed they are, there is no justification for force in Manchuria."* Such a statement, coupled with the precipitate action of Secretary of State Stimson in co-operating with the League, will arouse legitimate suspicion in Japan of our diplomacy. It is grossly unfair to Japan.

Senator Borah says: *"if the four or five leading nations were as much concerned about abiding by international law and treaties as they are in forcing smaller nations and subjugated nations to abide by them we would be a fairly peaceful world."* Yet no man knows better than the Chairman of the Senate Foreign Relations Committee that the concern of these four or five large powers for observance of the treaties is all that preserves world peace and stability, that unless they rigidly enforce respect for their provisions, this world of ours would face a general onslaught on all covenants and agreements which fail to meet with the approval of those states who feel that their rights have been impaired.

Urging the recognition of Russia, Senator Borah says:

"Recognition of Russia does not mean recognition of communism any more than recognition of the Fascist government of Italy recognizes Fascism as an ideal form of government. In 1798 our new government recognized the bloody French revolutionary government because, as Washington said, 'the road may be bloody but it is the only road France can take to permanent democracy'."

Well, what road should be taken in Manchuria? Who will save the millions of helpless serfs from having their life blood drained away by a vampire government which paralyzes its victims

into non-resistance by the weight of an army of 400,000 otherwise useless soldiers? How can the Chinese free themselves from a system of oppression before which the old French and Russian despotisms pale into insignificance? Is the world to stand by and make no move to prevent another catastrophe that will engulf in its horrors one quarter of the human race? Japan is China's next door neighbor. The preservation of law and order and good government in Manchuria is vital to her existence. Was it better for Japan to step in and prevent a calamity while there was yet time or should she have waited until it was too late to protect herself? Permanent peace and democracy, the restoration of the rights, liberties and well-being of a people and their gradual elevation to a plane of equality with other self-respecting peoples of the world, could never have been achieved in any way other than the road taken by Japan. Japan has done for the people of Manchuria what they could not do for themselves.

Perhaps the senator from Idaho would have preferred to have waited for the Chinese to repeat the scenes of the French and Russian revolutions and applauded as Manchuria went Red and took her place in the family of nations as another tight little Soviet republic like Mongolia. It was headed that way until Japan moved to protect herself.

We agree with Senator Borah in that Russia is on the road to democracy based on its own conception of justice and freedom and that if there is to be lasting peace in Europe and Asia the Soviet must be recognized. It is the height of folly for the United States and the League to interfere in a triangular quarrel and bring pressure to bear upon two members to the dispute while the third and perhaps most formidable is contemptuous of their decisions. There can be no peace in Asia, no permanent solution to the problem of Manchuria as long as Russia's interests and policies are permitted free scope for development. To coerce Japan, through the League, the Kellogg Pact or the Nine Power Treaty to surrender her liberty of action or her conception of self-defense under such conditions, is to take the side of Russia. That way lies madness. Yet this is the road the League and Washington were travelling when they were stopped by public opinion.

If, in the next session of Congress, Senator Borah will concentrate his intelligence, ability and powers in preserving the rights and liberties of the people whose representative he is and calls to account those in his own party who would have sacrificed these liberties against the emphatic mandate of the nation, he will rally to his support a large section of public opinion which is getting tired of seeing its government made the goat of international politics.—G.B.R.

China, the New World Power

No matter what action the League may take in seeking a settlement of the Sino-Japanese clash, its prestige has received a serious set-back. Its prolonged indifference to Far Eastern problems and causes which make for international discord and strife arising out of the chaotic conditions of a member state; its undue haste in taking China's side in the Manchurian dispute and ignoring the basic issues involved, is evidence of a bias which impairs its value as an arbiter of world affairs. Volumes have been written about Manchuria. Every student understands that it is a three-cornered problem complicated and rendered almost impossible of peaceful solution by the fact that one of the principals to the dispute, together with the Pacific Power most keenly interested in preserving the peace, are outside the League. To rush blindly into such a triangular conflict in support of any one side without a full knowledge of all the causes, is sufficient justification for Japan to serve notice of her intention to withdraw from the League and retain her independence of action until such time as Russia and the United States become members.

Intent upon its own affairs, the outside world can see only the outward manifestations of a policy of self-defense on the part of Japan brought into play by the violation of treaties by a country falling to pieces under a government of bandit generals and the slow steady relentless onward march of a nation whose aims and aspirations constitute a challenge and a menace not only to China and Japan but to the whole civilized world. In her present state of chaos, China is powerless to oppose these forces, which if not checked now, must inevitably bring about her extinction as a state. With nearly three million men under arms and at least two million armed bandits and communists (double the number of all the men in the combined armies of the world), China confesses her inability to protect her territory and calls upon the rest of the world to fight her battles. China has made no move with this vast army to enforce her sovereignty over Mongolia and discharge her obligations to Japan, playing the game hand in glove with the Soviet while resisting every effort on the part of Japan to defend herself. When the Soviet threw its forces into North Manchuria to enforce its rights under the treaties, China made

no official appeal to the League to protect her interests. For nearly two years, the Chinese and Soviet plenipotentiaries have been negotiating a settlement of the Chinese Eastern Railway dispute and there are reasons to believe that when a formula is arrived at, it will recognize Russia's paramountcy in Mongolia and other regions now nominally part of the Chinese Republic.

That Mongolia is a sealed Soviet sphere, closed to foreign trade, travel and residence, even to foreign consuls accredited to China, is known to the foreign offices of the world. That China is playing the Soviet game in keeping what is going on in Mongolia from becoming known to the outside world, is borne out by the activities of her border troops in turning back, arresting, imprisoning or executing any party of outsiders who may attempt to penetrate behind the screen. The existence of a close understanding between China and the Soviet is furthermore suggested by the otherwise inexplicable refusal of the Chinese authorities to permit Roy Chapman Andrews to continue his scientific explorations in Mongolia and the same understanding will probably explain the opposition on the part of the Chinese which resulted in the break-up of the French scientific expedition that attempted to explore a route through Kansu and Sinkiang to Turkestan. The sudden interest on the part of the Chinese authorities in excluding foreigners and especially the Japanese from regions where the Soviet is working out its forward policies, has a most sinister significance.

In 1896, Li Hung-chang sold his country into a secret alliance with Russia in order to be revenged upon Japan. In eight years, the Far East was deluged with blood. In 1925, Dr. Sun Yat-sen from altogether different motives, invited the aid of the Soviet in organizing and directing the new Nationalist movement. As a consequence, Communism is now firmly implanted in the Yangtze Valley and other regions of China. In a hopeless and losing struggle to undo this mistake, more millions of poor, deluded people have been massacred, more homes and property destroyed, more human misery and destitution and more lawlessness and disorder created than in any great war of modern times, the World War not excepted. The Chinese militarists have yet to learn that they cannot kill an idea, especially when that idea leads to the liberation of the masses from their yoke.

If China were an organized, unified state instead of a civilization or race trying to find itself, Japan and the outside world, might rest satisfied that Nanking would resist to the bitter end any further communization of the country or alienation of its territory. But Nanking can give no such guarantees. The bandit ruler of any border province is a law unto himself, swayed by his own self-interest. How many of these satraps are in the pay of or working in collusion with Moscow will never be known until the game of empire is played out. Why should the Chinese border generals guard Mongolia from the prying eyes of Japanese intelligence missions? Why should the same Northern bandit overlords refuse permission this year to Roy Chapman Andrews to continue his explorations in Mongolia? Why was the French Scientific Mission into Kansu and Sinkiang turned back? What is behind the recent Mohammedan coup d'état in Kansu and Kokonor? Why were the pilots of the German mail plane shot down in Mongolia and conducted as prisoners to Urga? Only the firm demands of the German Government saved these men from being summarily executed. Did they see too much? Would their testimony as to the existence and distribution of the Soviet-led Mongol army help the rest of the world to understand better what is going on behind the screen? We believe this to be the truth. What is His Excellency Moh Te-hui and his large mission doing in Moscow for over a year? Why is it that China hysterically demands of the League immediate application of sanctions against Japan and cries for intervention in the present situation when she refrained from appealing for help against Russia and when, after two years of negotiating, the controversy is still unsettled? Why should Japan be expected to come to an immediate agreement over issues which China has been two years discussing with Russia and to which the latter is an interested party?

We are hearing a lot about the Nine Power Treaty in the present dispute and that the United States and other signatories must bring pressure to bear upon Japan to comply with its provisions which calls for full and frank communication between the Contracting Powers before any one of them can take individual action in defense of its rights. That treaty was China's Magna

Charta and in conceding to her full sovereign rights it automatically imposed upon her the full duties of a sovereign state. Has China faithfully discharged her obligations? To keep to the point it is only necessary to refer to the opening paragraph in the treaty in which the Contracting Powers agree to respect the sovereignty, the independence and the territorial and administrative integrity of China and to the last paragraph of Article 3, in which China undertakes to be guided by the principles stated in the preceding stipulations, even with powers not signatory to the treaty.

Russia has failed to respect the sovereignty of China, has boldly annexed Mongolia and is steadily pressing forward in other outlying regions, yet China has offered no resistance while Japan's position and rights in South Manchuria are being menaced by the activities of the Soviet from within Mongolia. China has failed to invoke the Nine Power Treaty by appealing to its signatories to intervene in her behalf, yet when Japan in self-defense, is compelled to act, China immediately remembers and demands its application. China lies down, surrenders her sovereignty and violates her commitments to the signatories of the Nine Power Treaty by refusing to exercise her rights of sovereignty and discharge her duties to another state, but appeals to High Heaven when the menaced third party moves to defend itself! There is more than one side to the Nine Power Treaty. There is something decidedly wrong with this picture. No first class European power or the United States would tolerate for one minute any outside interference in a dispute in which the evidence points so strongly to an understanding inimical to its security.

* * *

Japan is now paying for ten years of conciliatory diplomacy beginning with her entrance into the League as one of the victors, a League which at the very outset was ready to throw her overboard in order to placate China. It was the height of folly for Japan to trust to post war friendships and understandings and sign without reservation a Covenant which gave the League the right to intervene in questions which affect her liberty of action in matters of vital interest and self-preservation. She signed a covenant for World Peace which specifically provided for no interference with the Monroe Doctrine, trusting to the Anglo-Japanese Alliance as a "regional understanding" to protect her interests. She paid the penalty for her lack of prevision at the Washington Conference which, according to Captain Yardley, was convened for the express purpose of depriving her of this last bulwark of defence.

The revelations in Captain Yardley's recent book on "The American Black Chamber," if true, shows the British Government as taking the initiative in proposing the Washington Conference for the purpose of "discussing the Anglo-Japanese Alliance" but desired to conceal its hand by having the invitations appear to proceed from the American Government. As usual with any proposal originating in Europe, Washington sponsored it as its own. In its desire to bring about the limitations of armaments, the American Government played Great Britain's game. If Yardley's book is to be taken seriously, there is only one deduction after reading the decoded diplomatic messages leading up to the convocation of the Washington Conference. The peace of the world, a euphonism at that particular moment for Anglo-American co-operation, demanded that the Anglo-Japanese Alliance be scrapped, Japan's naval program curtailed and China set up as an independent and sovereign state to offset Japan's power of offense. So they stripped Japan of the benefit of her "regional understanding" under Article 21 of the League Covenant and in its place gave her a nice little old-ladies' agreement covering insular possessions in the Pacific and a Nine Power Pact, providing for full and frank communication between the contracting Powers before any one Power could move to defend its rights in China.

Then they manoeuvred Japan into the Kellogg Peace Pact in which the good old Monroe Doctrine is recognized *sub silencio*, that is, it is taken for granted, while Great Britain laid down her own Regional Doctrine by reserving freedom of action to defend her rights and position in "certain regions." The regions were not specified. It is assumed they are meant to cover Egypt, the Suez Canal and the Persian Gulf, but in default of an explicit definition, they may embrace any region in any part of the world whose protection Great Britain may contend is a matter of self-defense to the British Empire.

Fortunately for Japan, its government in accepting the draft Kellogg Treaty reserved to itself the right of self defense, a right which became the heart of the treaty. The Kellogg Pact definitely links the United States with the League as a guardian of world peace, as any violation of its provisions by a Member of the League is also a breach of the League Covenant. In fact though not in form, the Kellogg Treaty is a treaty between the United States and the League.

By scrapping the Anglo-Japanese Alliance, depriving Japan of the benefit of Article 21, of the Covenant, then abrogating the Lansing-Ishii Agreement and subsequently inducing her to sign the Kellogg Pact without specifically reserving the right to defend her vital interests in "certain" or definite territories, Japan surrendered her military superiority and dominant position in Eastern Asia to a nation whose traditional weapons of offense and defense are now recognized as the determining factor in the settlement of all future international disputes. That the boycott and economic pressure can inflict greater misery and ruin than actual warfare, that it is one of the most forceful weapons yet devised to compel the acceptance of a national viewpoint, that it is *war* in one of its most acute forms, goes unheeded.

The moment war is renounced and outlawed as an instrument for the settlement of international disputes, the weakest nation is placed on an equality with the strongest military power and the victory in any dispute will go to the nation that can talk the loudest and longest and which is the most unscrupulous in presenting its case and flooding the world with propaganda. When, to this, is added the power of the boycott and a market coveted by the judges, there can be no uncertainty as to the outcome. In any such war of words victory will go to the side which can write the longest communiques, argue its case without regard to the facts, stir up an emotional world interest and offer the bribe of rich trade rewards. In such a war, Japan is hopelessly out-classed.

In her interminable disputes with China, Japan is placed in the same embarrassing position that the United States finds itself in whenever she has to face a critical situation in Latin America. If the American Government should ever weaken and permit these disputes to go before an international tribunal or even consent to discuss vital principles or treaties, the Spanish-American diplomats would argue her into a bow-knot in thirty minutes. The United States holds her own only by standing pat on her interpretation of basic problems and stiffening her backbone against any impairment of vital doctrines.

The British have similarly preserved their right to self-preservation by a firm insistence upon broad principles which admit of no outside discussion as to their meaning. The equally practical French hold no illusions. They take no chances. Accepting joyously every treaty or understanding which makes for world peace, the French have nevertheless concentrated their energies on building a new Chinese Wall of defense, the last word in modern fortifications, along their entire frontier. They welcome peace, but provide their own security.

The Japanese, confiding in the justice of their policies, believing that the rest of the world is fully informed of their problems, have failed to take the necessary precautions to preserve their own initiative in defense of vital doctrines and as a consequence are invariably caught unprepared in their disputes with China, placed on the defensive and go down to defeat before the onslaught of propaganda hurled against them by their more versatile and articulate adversaries.

The inborn reticence of the race, a reluctance that at times seems to be an inability to express themselves forcibly, coupled with a profound regard and respect for the conventions of polite and dignified intercourse, places the Japanese in an inferior position in any battle of wits with a more voluble, hysterical and unreasonable adversary like their racial neighbors. In any such controversy, Japan's defense lies not in dialectics but in the rigid spine.

Two years ago discussing Manchuria with a young Chinese government official recently graduated from an American university, he launched out in a violent denunciation of Japan and banging his fist on the table, declared:

"Some day we will lick those Japanese; some day we will drive them out of Manchuria and retake Korea!"

"I wouldn't talk about it so much until you are ready to do it, the writer jokingly retorted. "Oh! I know all that," he answered; "we can't lick them yet; we can't fight them now; but we can swear at them: we can call them names and we can tell the world what we think of them, and that is just what we are doing."

In these few words are embraced the whole Chinese race psychology, a nation with pent-up-anger-in-the-heart telling its troubles to the world: the wars of the war-lords enacted on a world stage to a world audience. Once China is assured of an open forum, her case is won. The League Council has provided her with this loud-speaker and a world broadcast and China now becomes the foremost Power in the world: her spokesmen the most formidable wranglers that the new world dispensation must contend against—G.B.R.

Back to Slavery?

The Divine Right to Loot and Oppress

HAD Jesse James and his gang been strong enough in numbers and the people of Missouri, Iowa, Minnesota, Kansas and Nebraska educated as nice little Willie boys under the new dispensation, he might have set himself up as the dictator of these Middle Western states and been recognized by the Federal Government as co-ruler with the President at Washington. Fortunately for America, our forebears were made of sterner stuff and the James gang found no rest until they bumped into the business end of a Colt or dangled from the end of a hempen cord. Had "Al" Capone and his ilk tried to put over their rackets on the American people of forty years ago, there would have been a Boot Hill outside Chicago covering a large part of Cook County filled with deceased gentlemen whose names would all bear a striking ethnical similarity.

In China, however, these things are done differently. Jesse or "Al" would have founded a new dynasty and been recognized by the Powers as one of the world's great rulers and his representa-

tive invited to take a seat in the Council of the League of Nations. For, this is how the Chang dynasty came into possession of the rich provinces of Manchuria. Chang Tso-lin, the founder, was a very grim, determined and ruthless Hunghutze leader who brooked no interference with his plans. He fought and bought his way upward into the lucrative post of military governor of the province, parcelled out the minor jobs to his relatives and subordinates, strengthened his forces until he commanded the biggest army in Asia, built the largest arsenal in the world and then told the rest of China where it could head in. By thrift and hard application to business he accumulated a vast fortune and when a bomb cut short his brilliant career, his power and wealth was handed on to a favorite son brought up to follow in his father's footsteps and taught all the tricks of the game. It has been estimated that Chang Tso-lin's wealth at the time of his demise was somewhere between four and five hundred million dollars silver, including some twenty millions in gold bars.

In the August number of this magazine, we gave some idea of just how the frugal Chang accumulated his pile. Our facts are now corroborated in the current issue of the *Chinese Economic Journal*, the official publication of the Ministry of Industry. In a chapter on "Japanese Financial Interests in Manchuria," this official publication, admits that although the exact amount of the "notorious" Fengpiao or Fengtien notes in circulation has never been known, the estimated nominal value in 1929 was not less than three billion dollars and while they were originally convertible at or slightly below par, they are now worthless. Further on, the article also admits that both the Kirin and Heilungkiang Provincial Banks issue copper notes in enormous quantity, estimated to be approximately ten and twelve billion "tiao" respectively and that these notes are also now inconvertible. In other words, the official economic publication of the National Government of the Republic of China reveals that in Manchuria alone the equivalent of over six billions of dollars of paper currency have been printed and circulated by the Chang dynasty and which is now a total loss to the people who hold them.

Mr. C. D. Bess, the United Press Staff Correspondent writing from Mukden under date of November 18, supplements the facts appearing in the August issue of this magazine and in the official publication of the Ministry of Industry. He says:

Mukden, November 18.—Chinese officials under Japanese protection have discovered for the first time the amazing extent of the profits reaped by Manchurian military governors during the past few years. Private accounts in Chinese banks which were examined by Japanese are alleged to show profits for the two Changs—father and son—and their favorites of something like \$500,000,000 silver.

Coming from Japanese sources, such estimates must be taken with reserve. But independent foreign observers agree that the figures cannot be far wrong.

For 19 years the two Changs and their satellites have had control of the revenues of Manchuria, more constant and abundant than of any other section of China. During that time, they have never had to account for receipts or expenditures. And the two Changs held the traditional Chinese idea that an official's first duty is to enrich himself, his family, and his friends.

Since the Japanese occupied Mukden in September, they have carefully studied all sources of revenue. Probably they know more about them to-day than the two Changs ever did. The latter distributed lucrative offices as gifts, and never demanded a careful accounting.

An investigation of the salt monopoly, for example, has shown that salt was sold for 16 times what it cost to produce. A small part of the profits went to the central government in recent years, to repay foreign loans, but most of them stayed in Manchuria to enrich officials. At least half these huge revenues are alleged to have gone into individual Chinese accounts.

Probably the greatest "gold mine" in Manchuria was the manufacture of paper money. The two Changs kept the printing presses busy, untroubled by banking laws which require putting up a reserve. Years ago, public faith in this money collapsed, and paper Manchurian dollars dropped as low as 500 to 50 cents gold. Recently they became worthless.

But the two Changs and their officials compelled Chinese farmers to sell their produce for this depreciated paper, and sold the beans and grain thus obtained for Japanese yen. The profits from such transactions were huge.

This autumn, despite the Japanese occupation, Chinese farmers have harvested one of the best crops in history. Whatever happens in Manchuria, it is fairly certain they will get real money for this crop for the first time in years. Worthless paper, for the time being at any rate, has disappeared.

One of the first Japanese moves after the occupation was to segregate accounts of Chinese officials in Mukden banks. They admitted they are holding this fund for support of the responsible Chinese government which they envision in Manchuria. And the Japanese say they will make sure that new officials account for the money turned over to them, and expend it for the public good.

The legality of Japanese methods since the occupation is doubtful. It is a question whether any international tribunal would approve many Japanese moves. But little sympathy is wasted by Chinese or anybody else on the deposed Manchurian officials.

A large part of the revenues went to support swollen armies, which were so unwieldy they did not even suppress banditry. A greater part swelled the fortunes of private individuals lucky enough to get offices from the dictators, which offices were nothing less than permission to get what they could for themselves, while comfortably providing for their masters.

The Chang dynasty apparently got all there was, forcing the poor, ignorant hard-working Chinese farmer to hand it over at the point of the bayonet. Chang maintained an army of four hundred thousand men just for this purpose and to keep the legitimate government of the Republic from sharing the graft.

An interesting side-light on how the official racket works is disclosed in the dispatch sent by the Editor of the *North-China Daily News*, to his paper from Harbin under date of November 6 which he concludes with the following:

"There is much excitement in the town to-day over the discovery that the Kwang Sing Bank of Heilungkiang had issued a large number of banknotes with a forged seal, thus entirely upsetting the basis of paper notes to silver."

The *Shanghai Evening Post* correspondent at Harbin, under date of November 13, telegraphs: "General Ma is seriously embarrassed due to the action of Mr. Wan Kuo-ping, son of Wan Fu-lin, governor of Heilungkiang province, who has gone to Peiping and who allegedly withdrew \$15,000,000 in provincial notes from the government bank and brought them to Harbin where he converted them into 3,000,000 yen."

It is difficult in this state of tension to comment on these reports. General Wan Fu-lin, the titular Governor of Heilungkiang Province has been in Peiping for several weeks, deserting his post when the war clouds began gathering over northern Manchuria and repeatedly tendering his resignation to Marshal Chang Hsueh-liang. The gallant governor who for several years has manipulated the finances of the provinces, handed over the command of his troops to General Ma Chun-shan (evidently a Mohammedan) and left him to fight it out with the Japanese. General Ma has been making a desperate attempt to stem the advance of the Japanese forces towards Tsitsihar, announcing that he will die fighting rather than submit. Just at the moment when he needs financial support and the loyal co-operation of every element in China, the son of his chief rifles the provincial treasury of \$15,000,000 in paper notes and hastily converts them into hard cash in one of the native banks in Harbin before decamping with the loot to join his parent in Peiping! The Chinese Stock Exchange, various guilds in Shanghai and the student organizations enthusiastic over Ma's firm stand are raising funds to help finance his battle for the nation!

This story will never be telegraphed to Geneva. Why should it? Did not the province of Heilungkiang belong to General Wan Fu-lin?

This is the picture of Manchuria, an empire developed to a high degree of prosperity by Japanese capital, initiative and brains, now impoverished, ruined and bled white to swell the fortunes of a swashbuckling bandit oligarchy masquerading as a modern government. It took a Japanese army to blast them out of their entrenched position and restore the rights and liberties of the down-trodden people who lacked the courage to rise and do the job for themselves. For the first time in many years the Manchurian farmer is getting real money for his crops and protected against the official harpies who have battered on his life blood. With an end to the graft, the main source of income for the maintenance of his armies disappears and Marshal Chang Hsueh-liang, the exalted co-ruler of China, unable to pay his troops or contribute to the maintenance of the hordes of literati and propagandists who live off his bounty, is forced out of the picture.

This high-handed outrage against the sovereignty of China and the rights of the bandits must be punished. Japan has committed the unpardonable crime of interfering with old custom and abolishing the source of revenues of the war-lords of Manchuria. The League of Nations which did not dare to intervene in the name of Humanity for fear of offending the bandit oligarchy that rules China, will probably demand that the territory be handed back to the rule of its oppressors.

There must be no compromise, no interference on the part of Japan with the Divine right to rule, loot and oppress. The rights and liberties of the people of Manchuria cannot be permitted to conflict with the strict interpretation of the treaties. They are slaves and slaves they must remain until they rise in their might and re-enact the orgies of blood that freed France and Russia from the oppression of their privileged taskmasters.

We may be wrong, but if Japan lives up to her declared intention to respect the territorial integrity of China, handing back Manchuria to the rule of properly organized, reasonably honest and efficient local governments, it will be the first step towards a real and lasting unification of the country under a league of regional autonomous states delegating their powers to a Central authority to act for them in foreign affairs, national security, finance and other things. In no other way can Manchuria be united to the main body of China without a disastrous civil war between the bandit oligarchy of the North and the civil regime that hopes to cement the nation together under the program of Dr. Sun Yat-sen.—G.B.R.

Faraday, Efficiency and China

Mechanization and the Standard of Life

By Professor C. A. MIDDLETON SMITH, M.Sc., M.I.M.E., A.M.I.E.E., of the University of Hongkong

THREE centenaries have been recently celebrated in London. They remind me very forcibly of events which have entirely changed Europe and America. In far less than one hundred years from to-day they will have effected an even greater change in China.

The first centenary commemorated the discovery of the induction of electric currents. In the Royal Institution, London, Michael Faraday, the one-time newsboy and book-binder's assistant, who made many valuable researches when he became a Professor,—Michael Faraday—demonstrated induction, in August 1831.

Faraday's experiments led directly to the dynamo and electric motor. Those machines to-day are doing an enormous amount of the monotonous labor and drudgery of the world. They are destined to bring a higher standard of living to the millions of China.

Clerk Maxwell and Wireless

It was in 1831 that James Clerk Maxwell was born in Edinburgh. Associated closely with the University of Cambridge this brilliant scientist produced important papers dealing with the dynamics of the electromagnetic field.

His book on "Electricity and Magnetism" is one of the most remarkable volumes that has ever been published. Radio Engineers rightly consider Clerk Maxwell as one of the great pioneers—the first pioneer—of their work. He wrote "we have strong reason to conclude that light itself—including radiant heat and other radiations, if any—is an electromagnetic field according to electromagnetic laws.

It was ten years later that a German, Heinrich Hertz, proved experimentally that the ether contains the electromagnetic waves which Clerk Maxwell said must be there. Hertz proved experimentally that they travel with the velocity of light. It was Maxwell's words that inspired Hertz to search for these waves. They are known to-day, all over the world, as Hertzian waves.

How Branby, in Paris, first set them in motion with his coherer, how Lodge, in London, with his de-coherer sent the first wireless signal; how Marconi, attracted to London by the news, interested Preece, the chief engineer of the British Post office and certain city financiers in the commercial possibilities of wireless—those are stories fascinating but too lengthy to detail just now.

We know that to-day radio telephony has provided close international connections. We have read that in Shanghai they have danced to the music that was, as they danced, being played by an orchestra in the Savoy Hotel, London. We find it hard to believe, almost impossible to understand, that a human voice was transmitted round the world from Schenectady and then broadcast. But we know that it happened.

To Advance Science

The third centenary which has recently been celebrated in London is that of the foundation of the British Association for the Advancement of Science. Its object has been, for a hundred years, to give a stronger impulse and a more systematic direction to scientific work. It has brought together scientists, not only of the British Empire, but of foreign countries.

Perhaps the most remarkable event connected with this centenary was the unanimous election of its President. For

General Smuts, from South Africa, stands second to no other man in the esteem of the people of Britain. Yet some of my school-friends were killed fighting against Smuts in South Africa in those black days of the South Africa war. It says much for the splendid character of Smuts and the practical common-sense of the British people, that the one time enemy is in London to-day, vigorously preaching the gospel of the New World Civilization in which, he believes, the Anglo-Saxon race must play a leading part.

What About China?

We have finished these centenary celebrations in London. They were, indeed, memorable. The Prime Minister, Ramsay MacDonald, presided at the Faraday commemorative meeting. His fine tribute to me who, he confessed, had immensely influenced his own outlook on life, was heard by a huge assembly and countless "listeners in."

In the midst of a grave political and financial crisis in London, this indomitable Scot left his seat in the House of Commons, forgot the city bankers and the delegates to the India Round Table conference, and reminded his huge audience that Faraday had risen to immortal fame by the simple, yet always difficult method of giving himself to the pursuit of truth and the duty of the day.

A few hours previously the delegates from all over the world had been presented to the President of the Royal Institution, the guardian of Faraday's apparatus. It was a delight to hear the applause that greeted the Chinese representative from Peking.

The delegate from Japan made a most excellent speech in English. He was one of the half-dozen or so foreign delegates who were, as distinguished scientists, made honorary members of the Royal Institution. Dr. Elihu Thompson, from the United States, was another.

As we celebrated, for some ten days, the centenary of this *annus mirabilis* 1831, we made visits to many places of interest. As soon as the writer mentioned that he was from Hongkong, everyone asked all sorts of questions about China.

It came as a shock to find that so little is known of the Far East in London. The remark of Sir Oliver Lodge was typical "Oh!

yes. I remember, you went out to Hongkong—you've been having some bad floods out there lately." Or, again, a scientist of world-fame said "We never hear of China unless it is civil war—they are always fighting out there—or flood or famine."

They find it hard to believe that the new civilization has begun in China.

When I suggested that there are thousands of Chinese graduates in science, returned from Universities of Europe and America, the retort usually was "Why don't they do something to set things straight?"

This leads me at once to suggest the formation of a Chinese Association for the Advancement of Science. It would prove of incalculable value to the country if run on the lines of the British Association. What better time than now to form it?

Constant association with Chinese students during nearly twenty years in Hongkong, and for eight years previously in the University of London, has made me convinced that they are capable of brilliant scientific research.

All new scientific development is of international value. The new world civilization is sweeping away the old divisions and boundaries.



Professor Middleton Smith

The Engineer in China

Agriculture is, and must ever remain, the most important industry in the world. We must have food—fuel for the human engine.

A most important scientific development is mechanical farming. New countries have developed and adopted it more rapidly than those whose farming had long traditions.

It has, however, made itself felt in England. The two leading pioneers have recently provided figures which show that, even in a conservative country with old traditions, mechanization in agriculture pays.

It is, perhaps, no accident that both of these pioneers had an engineering training. They dislike waste in any form—whether of mechanical or human energy. They have applied engineering methods, not only by using machinery, but in seeking efficiency in every phase of their work. And they have made farming pay in England while less efficient workers have failed.

In the days when there were no engines, the farmer in England relied on horses for much of his tractive effort. In those days the successful farmer was one who understood horses. The two pioneers have shown that, in the new civilization, engineering knowledge is essential for efficiency on the farm.

Chinese Engineers Wanted

That leads me to my last suggestion. It is that, if China is to take her rightful part in the new world civilization, she must

encourage a far greater proportion of her young men to have an engineering training.

The root cause of China's agony to-day is the low standard of living of the poor. It is a menace, not only to peace in China, but to the maintenance of a decent standard of living in other countries. Before world civilization can become real, the human rights of the individual must be respected and his immediate necessities satisfied.

How can moral and mental faculties grow when men, women and children toil unceasingly without relaxation? How can this human tragedy of China cease without the help of science applied by the Chinese?

In Europe and America we find countless thousands relieved of monotonous manual labor and drudgery by dynamic electricity, the great discovery made by Faraday one hundred years ago.

Turn on a switch and there is light, or heat. Turn it off and the fire is extinguished. No dirt, no carrying of fuel, no ashes, no clearing up. Vacuum cleaners, fans and refrigerators are implements of the new civilization. Motor-cars, broadcasting, even talkies enlarge our mental outlook and educate us. The two latter bring to the poor the blessings of good music and sometimes instruction.

These great gifts are here. They have made us realize our debt to Faraday and those countless other workers who have given them to us.

Surely the least we can do is to help, with all our might to usher in the new civilization through the length and breadth of China.

Japanese Shipbuilding

By Y. TAGI, M.Eng., M.I.N.A., M.I. Mar. E.

THE economic cycle is a natural phenomenon in every industry and trade, like the seasons, the tides and day and night. In ordinary trades the period of a "boom" after a depression is not generally long, but in the shipbuilding industry, the cycle is often somewhat extended. The present world-wide industrial depression has given unprecedented distress to the shipbuilding and shipping world, coming after the prolonged stoppage after the Great War.

Japan suffered from the depression as much as did other countries, but owing to a major scheme of her leading companies for the construction of modern ships, she was able to enjoy a temporary prosperity for her shipbuilding industry. The boom has been, however, only short lived, as the shipbuilding scheme contemplated only replacement of obsolete ships with efficient modern motorships, particularly for those lines running over main routes of the companies.

The ships included in this construction program of two leading Japanese shipowners are as follows:—

Name of Ship	Gross Tonnage	Design S.H.P.	Trial	Engines
FOR THE N.Y.K. LINE—				
Asama Maru ..	16,946	16,000	20.7	Sulzer
Tatsuta Maru ..	16,955	16,000	20.9	Mitsubishi-Sulzer
Chichibu Maru ..	17,497	16,000	20.6	B. & W.
Hikawa Maru ..	11,621	11,000	18.2	"
Hiye Maru ..	11,000	11,000	18.5	"
Heian Maru ..	11,000	11,000	18.0	Mitsubishi-Sulzer
Terukuni Maru ..	11,979	10,000	17.7	"
Yasukuni Maru ..	11,900	10,000	18.0	"
Heiyo Maru ..	9,815	8,000	16.7	"
FOR THE O.S.K. LINE—				
Buenos Aires Maru ..	9,626	6,000	16.5	Mitsubishi-Sulzer
Rio de Janeiro Maru ..	"	"	17.0	"
Kinai Maru ..	8,357	7,200	18.45	"
Tokai Maru ..	"	"	17.51	"
Sanyo Maru ..	"	"	18.586	"
Hokuriku Maru ..	"	"	18.436	"
Sydney Maru ..	5,435	3,000	17.147	B. & W.
Melbourne Maru ..	"	"	16.4	"
Brisbane Maru ..	"	"	16.1	"
Kanto Maru *	8,601	7,500	18.34	M.A.N.
Kansai Maru *	"	"	18.792	Yokohama-M.A.N.

* Chartered from Kishimoto Kisen Kaisha.

Nearly all of these vessels were completed in the last two or three years.

A considerable number of cargo motorships and other types for secondary shipowners, such as the Toyo Kisen Kaisha, Kokusai Kisen Kaisha, Yamashita Kisen Kaisha, Dairen Steamship Company, Yamamoto Trading Company, Kishimoto Kisen Kaisha, Shimatani Kisen Kaisha, Ogura Petroleum Company, Iino Shoji Kaisha, Marine Departments of Mitsubishi Trading Company and Mitsui Bussan Kaisha, the Nautical and Fisheries Institutes, etc., have been built, whilst some are still under construction. These were able to keep the shipyards fairly busy, but they have now only a few vessels of large size, and as no further contracts of major importance are in sight, future prospects for Japanese shipbuilding appear extremely gloomy.

Thus, the incidental prosperity of the Japanese shipbuilding industry having passed away, shipbuilders and engineers are now compelled to face another most serious depression.

Various plans have been proposed in order to enforce a new method in shipbuilding and shipping. A special committee was appointed by the Government, including leading businessmen in these trades, naval architects and engineers, for the rationalization and rectification of the shipbuilding industry.

After prolonged study, the committee submitted the following proposals to the Government:—

"The equipment and capacity of Japanese shipyards are far beyond present requirements, while the near future holds no prospect of any increase in the building of tonnage. If the present situation is left to its natural trend, desperate competition will develop among the shipbuilders and further serious disturbances may be expected. Consequently, in order to adjust requirements and conditions, the consolidation and rectification of shipbuilding and engineering companies are necessary to strengthen the foundations of these industries and to reduce production costs by rationalizing the administration of each firm."

The First Plan

1. The amalgamation of shipbuilding firms should be effected and in consequence, various lesser works should be closed down so

that actual work may be concentrated in major establishments. In this way, industrial efficiency will be considerably increased. Should difficulties develop for a large-scale amalgamation of the shipbuilding companies owing to differences in their traditional and financial conditions, those firms having comparatively similar interests and connections should speedily consolidate locally or in groups.

2. When shipbuilding firms amalgamate locally and two or more enterprising groups are constituted, each group should co-operate with the others in carrying on their businesses.

The Second Plan

1. To establish a new company with investments from each shipbuilding company for the united administration of their enterprises.

2. To this new company each firm joining should transfer in a trust deed all or a part of their shipyards and works equipment, and the new company will hand over shares to the participating companies at a fixed ratio.

3. The new company transacting business as a principal and utilizing only the shipbuilding equipment of participating companies would cause comparatively inefficient works to close down and the undertakings would be concentrated to the best advantage. Profits will be distributed to the participation companies at a fixed rate.

4. The companies included in this new company will exist as formerly, possessing shares of the new company and may continue partially to operate their businesses as hitherto in accordance with conditions of their trust-deed agreements with the new company.

The Third Plan

1. To establish a new company with assigned administrations and investments of each shipbuilding company. The principle is similar to the second plan, but the legal constitution is different.

2. It is necessary to investigate in executing this plan, whether the legal constitution should refer to the rent of materials, installations and the business rights of the joining companies, or be dealt with as a trust contract for the administration of the enterprises. Profits of the new company would be distributed at a fixed ratio to the participating companies as is in the second plan.

These plans, however, entail many difficulties in actuality, as the committee did not take account of the financial status or the liabilities of the various companies and no definite scheme was given to deal with the unemployed, numbering more than 11,000 to be created after execution of any of these plans.

Although the plans have certain drawbacks, yet they form the final proposals of the committee authorized by the Government. No definite steps have been taken, however, by the government to carry out any of the plans, owing to the conservative and pessimistic policy adopted in the face of the present financial situation. Promoters have negotiated several times through various channels to arrive at a definite agreement, and they have tried to realize at least, against all difficulties, the consolidation of the shipyards in the Eastern District of Japan, including Uraga, Yokohama and Ishikawa-jima Dockyards. The irresolute attitude of the Government has caused some alarm, it is said, and it is feared that a tendency may arise to form two competitive influences, *i.e.*, two largest capitalist concerns of Mitsubishi and Mitsui on one side and the combined influences of remaining shipbuilding and shipping firms on the other side.

It has been also emphatically requested by shipbuilders that the importation of old ships should be reduced to a minimum by increasing import duties fixed according to the age of ships. Further it is urged that the subsidy for new shipbuilding should be re-established, while works capable of being converted to other industries should be so converted. Also it is asked that registration fees be considerably reduced in case of the amalgamation of companies.

As regards the shipping problem of Japan, the situation may become far more harrowing under the world-wide depression. The recent merciless situation has compelled even the leading shipping companies to lay up, or to sell, or to scrap their abundant tonnage. The N.Y.K. Line placed more than sixteen vessels on the lay-up list, whilst the O.S.K. Line reduced their chartered tonnage of 130,000 tons to 90,000 tons and nearly half a dozen ships were

laid up. The total laid-up tonnage of Japanese ships including all types and tonnage at the end of last June, was 218,000 tons.

Recently two of the largest concerns, the N.Y.K. and O.S.K. Lines arrived at a mutual agreement for the rectification of their overlapping routes, mutual utilization of their equipment, common acceptance of passengers, etc., in order to avoid useless competition of these two companies and to promote in general the shipping and trading situation of Japan.

The act for financing the building of new ships took effect last year.

This act embodies the contract of the Government and the Bank of Industry for financing new shipbuilding expenditure up to Y.5,000,000 per year as loans under the following conditions:—

1. (a) The loan is limited to capital for building new ships.
(b) The annual redemption to be completed within 15 years.
(c) The first mortgage should be established upon the vessels under construction.
(d) The mortgage price should be under $\frac{2}{3}$ of the ship's price and within $\frac{4}{5}$ of the insured value.
(e) The interest on the loan is 6 per cent per annum.
2. The loan is limited to Japanese subjects or shipping companies whose members and shareholders are Japanese subjects only, and on condition of building the vessels in Japan proper.
3. The vessels to be built are limited to steel cargo boats of over 5,000 gross tons, with a speed of over 14 knots at a half load.
4. The Government grant to meet a deficit is an amount corresponding to 1.5 per cent annually of the amount loaned. If the original capital cost of the loan exceeds 6 per cent annually, the excess rate will be added to the grant and if the capital cost is less than 6 per cent the surplus rate will be reduced from the grant.
5. Loans will require the approval of the Minister of Treasury.

Arrangements for financing shipping concerns for new construction have been under discussion for a considerable period and the proposals as originally submitted to the Government were on a quite large scale, but the proposals of the Government have been on such a small scale that owners would be restricted to a construction program under 50,000 gross tons annually, assuming building costs would be at the rate of Y.150 per gross ton. Therefore neither shipowners nor shipbuilders see any great value in the effect of the shipping financing act.

Another movement has been launched by the Japanese Shipowners' Association after formation of "The Committee to Stimulate Japanese Shipping." The idea behind this is to exert efforts to overcome the shipping depression without assistance from the Government.

The idea is that old ships will be scrapped as the first step under the following scheme:—

1. A fund will be collected for distribution of a total annual subvention of Y. 1,000,000 to about thirty-four companies.
2. To the owners desiring to scrap their old ships, a subvention of Y. 10 per gross ton will be granted.
3. After continuous work for three years, about 300,000 tons of old ships of age over 35 years will be scrapped.

The necessity of breaking up old ships has been, of course, keenly impressed upon both shipowners and shipbuilders, but it appears that this scheme has not yet been actually effected.

A substantial number of old ships were scrapped during the first half of this year ending June 30, the total number having been 30 and total gross tonnage 156,475 tons, but ships under the Japanese flag were only eight in number and 27,430 gross tons in total.

Another shipping relief plan to subsidize ocean-going vessels was originated by the Marine Bureau of the Ministry of Communications, but the negotiations with the Ministry of Finance to obtain Y. 5,000,000 for the subsidy failed owing to the present financial difficulties of the Government. An outline of this plan, however, is as follows:—

1. The subsidy was limited to vessels owned by Japanese subjects.

2. The subsidy was granted for cargo and/or passenger vessels owned privately, or hired or chartered, but to be registered in Japan, and navigating between the Coastal Service Area and ports outside of this area, and operating more than 40,000 gross tons in total per year.
3. The vessels should not be smaller than 4,000 tons in gross and not less than 12 knots in speed, except (a) those over 20 years of age, (b) those following the Government's imperative routes and (c) those registered after September 1, 1930.
4. The subsidy was limited to Y. 5,000,000 per year and the rate was Y. 0.15 per ton per 1,000 nautical miles for vessels under 10 years of age, and Y. 0.075 for vessels between 10 and 20 years of age. The shortest distance between ports was taken as the mileage.
5. The term of this plan was to be for two years and the amount of subsidy Y. 5,000,000 for 1931 and about the same in 1932.

Thus, various plans were submitted to the Government by the committee and enterprising institutes in order to promote the shipbuilding and shipping industries of Japan, yet very little has been done by the Government for this important purpose under excuse of the great shortage of revenues and the extreme saving policy of the conservative Cabinet.

Consequently, each shipping and shipbuilding firm should establish its own scheme without looking for Government assistance. Under such circumstances, amalgamation or consolidation, or even co-operation, has become rather difficult, and the establishment of a national policy for the expansion or promotion of the shipbuilding and shipping industries, is at present, only a matter of discussion.

Private schemes may be summarized as follows:—

O.S.K. Line is going to build two express cargo ships of 9,700 gross tons and 18 knots for the Orient-New York Service, and one of 6,200 gross tons of 17 knots was ordered from the Mitsubishi Nagasaki Shipyard, for the Dairen Route.

Ishiwara Sangyo Kaisha has ordered from Mitsubishi Nagasaki Shipyard and Harima Dockyard, two cargo boats of 6,000 tons type with a speed of 15 knots for the South Seas Service.

Kokusai Kisen Kaisha ordered two motorships of 9,000 gross tons and 18 knots, one from Uruga Dockyard and the other from Kawasaki Dockyard. One of these has been completed and the other is approaching completion. Further, this company is going to add two more vessels of the same type.

Toyo Kisen Kaisha is planning to build two cargo ships of 9,000 gross tons under aid of the Yasuda Bank.

N.Y.K. Line has a scheme to construct four express cargo boats of 10,000-12,000 gross tons with a speed of 18 knots, but this has not yet been decided.

Mitsui Bussan Kaisha has completed preparations for building one to three motorships of 8,000 tons type in their Tama Dockyard.

Iino Shoji Kaisha is going to build another high speed tanker of the same type as the *Fujisan Maru*.

Government Railways will build a new ice-breaking passenger ship of 3,200 gross tons, quotations having been already invited from leading shipyards.

As to more doubtful plans, the Ogura Petroleum Company may order another motor tanker from Mitsubishi Dockyard; Chosen Yusen Kaisha proposes to build two cargo motorships of 3,500 tons type and Nisshin Kisen Kaisha may build 3,000 ton ships.

Some of the ships mentioned above are now under construction, but the majority are at present only planned.

All are Motorships

It is, however, interesting to note that practically all are motorships with exceptionally high speeds, while the Ishiwara Company's ships are to be equipped with pulverized fuel plants and Bauer-Wach's exhaust turbines.

The tendency toward high speed cargo motorships is extremely remarkable in Japan, not only in general freight service, but also in oil tankers. The recently built cargo motorships of the *Kinai Maru* class and the *Kwanto Maru* class of the O.S.K. Line, and the *Kirishima Maru* class of Kokusai Kisen Kaisha, all have a mean trial speed of over 18 knots and a service speed of over 16 knots, while the motor tanker *Teiyo Maru* of the Nippon

Tanker Kaisha has an actual mean trial speed of 17.53 knots and a fully loaded service speed of 14.5 knots, and the latest motor tanker *Fujisan Maru* of Iino Shoji Kaisha has a mean trial speed of 18.8 knots and a fully loaded service speed of 16 knots, so that she has broken the record of the *Teiyo Maru* and has acquired the blue riband in the world's tanker fleet.

The speed epoch has broken the old tradition of economy in slow cargo boats, and a high speed gives various advantages to the owners in collecting goods for speedy transportation and in holding a superior position in world shipping competition. Such high speed for cargo boats is only available through the adoption of the Diesel engine combined with its economical operation, while ordinary cargo steamships could never have attained it.

High speed means high power and a consequent increase of machinery weight, which has compelled the ship designer to take special precautions for structural strength of the hull, as usual requirements by Classification Societies have been inadequate for high-powered cargo ships, and to select the most suitable underwater form for a minimum propulsive resistance in conjunction with the adoption of efficient rudder, propellers and other various auxiliaries and fittings, not only for the saving of fuel at sea, but also to minimize time spent in ports.

It is also interesting to note that the advantage of cargo motorships has been fully recognized even in limited zones in which connection the writer can mention four cargo motorships of the *Santo Maru* and *Kanan Maru* classes of the Dairen Steamship Co., built very recently in Japan. These are of about 3,300 gross tons, two of them being equipped with Sulzer type engines and the others with B. & W. engines, and are operated in the restricted area of Dairen-China-Japan, where good steaming coal can be supplied at very low cost, particularly in Dairen and Moji. Still the company is convinced of the advantage of Diesel propulsion. Another instance is the adoption of motor train ferries by the Imperial Japanese Government Railways. Further, the Railway authorities are going to build large cross-channel boats equipped with Diesel engines between Shimonoseki and Fusan, in Korea, as soon as their finances permit, and also are planning several Diesel train ferries across the Shimonoseki-Moji Strait. In these ports, coal is obtainable at the lowest price, as they are very near to coal mining centers of Southern Japan, while Diesel oil is very expensive, yet the adoption of Diesel-engined ships has several advantages in their carrying capacity, improved accommodations for passengers and ship's members, no stand-by loss, etc., and in train ferries the wagon deck can be very conveniently arranged. These advantages overcome the handicap in the cost of fuel.

Another tendency which should not be overlooked in Japan is the introduction of pulverized fuel burning ships by the Ishiwara Sangyo Company. The adoption of this system will possibly increase in conjunction with exhaust turbines.

The recent development of the Diesel engine in the building of large units has been extremely remarkable in Japan, including Sulzer, M.A.N., Burmeister & Wain types, etc., and numerous improvements have been carried out in the original design shows the general superiority over the original design and over imported engines in actual sea performance. As to smaller units, Mitsubishi-Vickers, Niigata-Nobels, Ikegai, Shinko Diesel engines, etc., have been extensively adopted in smaller vessels, and the Dieselization of fishing craft, tugs and various other types of ships is rapidly progressing.

Although there is a certain quantity of proposed construction of new large vessels, it is not enough to keep the shipyards reasonably engaged, as the total merchant shipbuilding capacity of Japan is over 620,000 tons per annum, for vessels over 4,000 gross tons.

Particularly at present, the proposed schemes being yet premature, there are only a few large vessels on building berths, and several shipyards are only existing by small craft construction, so the time is considered the worst ever experienced and the shock is the more bitter after the temporary boom of a short time ago.

It is not necessary, however, to regard the matter too pessimistically, as the above-mentioned various plans for the general improvement of the shipping and shipbuilding situations are gradually gaining influence, and the general endeavor to overcome the present difficulties will certainly show again the truth of the well-known maxim of "where there is a will, there is a way."

Machinery Market in China

From the *British Export Gazette*

To the casual observer it may not be apparent, but in the minds of foreign business men in Shanghai, Peking, Tientsin and other large centers, there is little doubt that China is yet again on the brink of a commercial revolution. It is as yet too early to forecast exactly what direction this will take, or what proportions it will assume, but this much is certain: the continuance of the present comparative political peace will assuredly assist the trade of the Republic, particularly in branches of industry such as engineering, railway activity and local manufacture. Orders for heavy machinery will be forthcoming in steadily increasing volume if political and military interference is discontinued, but it still remains to be seen which type of manufacture will finally win the Chinese regard—to wit, the high quality or the low-priced article. Not every manufacturer of heavy machinery in Great Britain realizes it—it is by no means their fault that they do not—but this is a moment of supreme importance in their commercial relationship with China. Everything depends upon the silver rate and the manner in which the average Chinese purchaser reacts to the steady decline in the value of the dollar and tael.

The facts, in short, are these. The Chinese, as a rule, has now less to spend on imported machinery than he had even during the gloomy days of military strife and usurpation. On the other hand, however, the maintenance of amicable relations between leaders has fostered a spirit of confidence in the future which to a large extent offsets the ill effects of reduced purchasing power, and aroused, in addition, a desire to "wait and see." Which will eventually triumph—trust in the present Administration, followed by an appreciation of silver prices and, as a consequence, a growing disposition to purchase "quality" goods; or distrust of the generals, a pessimistic outlook in regard to the future worth of the dollar, and, naturally enough, a lower quality, if not quantity, level of purchases from abroad? That is the problem, and the ultimate decision is certain substantially to influence the commercial future of the Republic. For does it not stand to reason that if the Chinese, during this period of depression, once take to acquiring machinery of short life, but low first cost, they will continue from habit and motives of economy to purchase this type even when the country returns to prosperity and a happier monetary condition? This must be avoided at all costs if British manufacturers are to maintain machinery sales to China at a creditable level. But how?

Lesson of the Piece Goods Trade

There was a time when in numerous instances Chinese buyers of industrial equipment requested only British suppliers to quote them prices for such. That was a very great compliment—they wanted only the best, and the best was to be had only from Great Britain. But only in isolated cases does this occur now. Why? Because the Chinese, for all his liking for a good machine, cannot so often afford the cost of it. It is urgently necessary for British business men to realize the gravity of the situation. True, it may only be transitory, but that is not the point. It is too much in the nature of a speculation to bank upon a return to normal conditions in the near future, and it is equally a risk to expect the old-time buying of "quality" goods, even if prosperity does return. Surely, with the lesson of the piece goods, provision and other trades before them, British machinery producers will read the signs aright ere it is too late to apply the remedy. These lines were once very largely the preserves of suppliers of "quality" goods, yet gradually they have fallen into the hands of Japanese and Continental interests, principally by reason of the sheer inability of the Chinese to find the money for the superior article.

The machinery trade, fortunately, is differently constituted, and it has not so readily succumbed to the power exerted by reduced monetary capacity. But make no mistake, it eventually will if steps are not at once taken to remedy matters. This is not as impossible as some business men seem to think. Admittedly, British suppliers cannot combat restricted purchasing power directly—that must be left to the good sense of the local diplomat and militarist—but there is more than one means whereby they may still prevail upon the Chinese buyer to maintain interest in high-class machinery. It is not suggested that to this end an effort be made

to reduce Home standards of production. That also is too important an affair for individual action, and, moreover, what Sir Ernest Thompson told Shanghai business men with reference to the piece goods trade—that Lancashire cannot lower its standards of organization and distribution—is probably true also of the machinery field. Besides, the slightest depreciation in British quality might very well result in disaster as great, if not greater than that now threatening on account of lowered buying power. For, be it remembered, "As good as British material" is a Chinese proverb. Industrialists, then, would appear to be a cleft stick, unable to turn either way to better their position, and confronted with the knowledge that they must inevitably suffer if they remain passive and inactive.

Poor Deliveries Retard Future Sales

But there is a way to surmount this barrier to trade, and that may be summed up in one word—service. For example, purchasers of internal combustion engines in the vicinity of Shanghai—and their views would probably find an echo in other large centers—complain that not only is the discrepancy in price between the British and German articles as much as 25 per cent, but that in the matter of deliveries Continental suppliers are much more prompt and consistent. With regard to the first part of the complaint, it is gratifying to note that several British manufacturers, by re-designing their models and cutting out all unnecessary "frills," are gradually lowering the price margin, but so far as concerns deliveries much remains to be done. The Chinese, as is well known, is a very keen business man, and anything that savors of undue delay creates in him misgivings which are scarcely a happy augury for future sales.

Then there is the question of social contact, which, if correctly interpreted, may well be classed under the heading of service. Chinese hospitality is proverbial, and, though British business men are not usually so obtuse as actually to refuse an invitation to attend a dinner or celebration, Oriental ceremonial is liable to render them ill at ease. Contrast their demeanor on these occasions with that of the German or American, whose lesser regard for the conventions, many of them imaginary, earns them numerous new clients. Social distinctions are certainly observed by the Chinese, else "face" would not be the power it is to-day, but silence is apt to be construed as aloofness, which is scarcely conducive to a cordial commercial relationship. As regards the cotton industry, the recent increase in orders for plant for the mills has been somewhat checked by the fact that imported apparatus, owing to the fall in exchange, now costs anything between 50 and 60 per cent more than it did in 1929. The natural corollary is that purchasers either favor machinery of the very cheapest type or demand extended terms of credit when interested in more costly apparatus. Were such inquiries instituted by firms of doubtful standing there would be justification for the disinclination of British companies to accede to the request, but when the local interests are of good reputation, refusal to grant the required terms is nothing more or less than bad business.

Flour-milling Equipment in Demand

Makers of industrial machinery of all kinds would be well advised to follow the example of British suppliers of flour-milling equipment, who, by the employment of progressive methods of service and advertising, have effectively curbed American and German competition, discredited the price fetish, and established excellent connections in all parts of the country. Similarly, the textile engineering trade has yielded to go-ahead selling methods, but in regard to electrical engineering the British position is far from good. This is at first sight unaccountable, inasmuch as British enterprise in this direction is acknowledged throughout the world to have attained a degree of efficiency far transcending that of many competitors. Yet in China British goods are often regarded as inferior to those of U.S.A. and German origin! This is, of course, a mistaken belief, but it will, nevertheless, persist while the organization and representation of competing interests in Shanghai and Peking is permitted to be so far in advance of British effort. In plain words, the Chinese market has of late been neglected by British electrical manufacturers, and it will need a strong and sustained effort to recover the ground lost to Japan and the U.S.A.

(Continued on page 693)

The Steel Industry of Japan

A SURVEY

By HAROLD HUGGINS

(Continued from October number).

IN Japan proper pig-iron manufactured on a large scale from ore is produced by only five makers, there are a number of very small plants making pig-iron which use charcoal as fuel, but their total production in 1929 was only 2,000 tons, one-seven-hundred-and-fiftieth of the total production in Japan and the Japanese colonies.

Using the electric furnace for remelting there are two rather large makers still in existence to-day.

The five pig-iron makers using iron ore are in the order of their importance :

- (1) Yawata Steel Works
- (2) Toyo Seitetsu K.K. (Oriental Steel Works)
- (3) Nihon Seikoshu K.K., (Japan Steel Works)
- (4) Kamaishi Kozan K.K. (Kamaishi Mine Co., Ltd.)
- (5) Asano Zosenjo K.K. (Steel Department of the Asano Shipbuilding Works).

Of this five, four are private concerns, the fifth the Yawata Steel Works, being entirely a government owned and operated institution.

There are two companies producing pig-iron for sale on the open market by remelting material in the electric furnace :

- (1) Tobatta Imono K.K. (Tobatta Castings Co., Ltd.)
- (2) Azuma Seiko K.K. (Azuma Steel Works, Ltd.).

Yawata Steel Works

The Yawata Steel Works often called the Imperial Steel Works, or the Government Steel Works, are, as the last name implies owned by the Imperial Japanese Government. They are under the control of the Department of Commerce and Industry, though since 1926 their accounts have been separated. (Since 1926 no public accounting of the Yawata Steel Works has been made).

In 1895 the Imperial Diet gave approval to the establishment of a government owned steel works, to have a capacity of 90,000 kilo tons of finished materials a year. For this purpose Y.4,095,793.40 was appropriated. In February, 1897, preliminary surveys having been completed the village of Yawata, in Fukuoka Prefecture, Kyushu, was selected as the site of the proposed works. Construction was begun that same year, and in February, 1901, the first blast furnace was started up. Production began in May the same year. By that time a total of Y.15,841,016.85 had been appropriated and disbursed.

Demand for steel had increased to such an extent that when the Russo-Japanese War broke out in 1904 another blast furnace had to be installed, and capacity was increased to 102,000 tons. Operating efficiency by this time had been materially bettered, as workmen were trained to their tasks. So important was the function of the works during the war that a special fund of Y.4,696,126 was granted it to be applied to producing, in particular, steel for making arms.

After the Russo-Japanese War, from 1906 on, the industrialization of Japan really began. Demand for steel increased much beyond the capacity of the Yawata Steel Works to supply. Again additions were made to the plant, and capacity was increased to

180,000 tons in 1909. For this purpose the Diet granted Y.10,880,000. But even this extension was not sufficient to make the works equal to the task of satisfying demand, and another Y.12,389,929 was voted to effect an increase of capacity to 300,000 tons a year, to be ready by 1915.

Before the outbreak of the European War, Japan's steel requirements were around 1,300,000 tons a year. This was much greater than the ability of the mills to supply. To meet the situation the government proposed to increase the annual output at Yawata to 650,000 tons a year. For this purpose Y.34,515,450 was granted, the necessary construction to be completed before 1920. During the war boom demand increased out of all bounds. Because machinery and materials could not be freely imported from Europe and America costs rose to such an extent that an extra Y.10,805,500 had to be granted before the works could be completed.

The panic of 1920 dealt a terrific blow to the private steel makers. But the Yawata Steel Works continued to increase capacity for all materials. New mills were built, new shapes were rolled, and to-day the capacity for pig-iron production alone is almost 700,000 tons a year.

The Yawata equipment to-day (end 1930), for producing pig-iron is :—

1	500 tons Blast Furnace
2	270 " " "
1	230 " " "
3	200 " " "

The annual capacity is rated at about 635,800 tons. But this is based on 340 days a year, and does not account for night work and holidays.

The original lay-out of the Yawata plant placed the steel mills alongside the water front, and the blast mills inland. Consequently the transport of ore overland to the furnaces was extremely inconvenient, and naturally an expensive process. In recent years, however, this condition has been somewhat modified and the costs of

handling ore for the furnaces have been cut down considerably.

Cost of pig-iron production at the Yawata Steel Works has been estimated by the Research Bureau of the Ministry of Railways at Y.34.205, per ton. But economies in operation are expected to decrease this to Y.28.196 in the near future. (Note: The report of the Bureau of Research does not specifically mention Yawata Steel Works; but the general condition of the report indicates Yawata Steel Works to the reader).

From rather indefinite data the following estimate is offered.

The ores used in the blast furnace at Yawata are mixed as follows :—

Straits Settlements ores	..	..	..	55 per cent
Chinese ores	..	..	..	35 "
Chosen and domestic ores	..	..	..	10 "
				100 "

The average iron content of these ores is taken at

Straits Settlements	..	..	..	63 per cent
Chinese	..	..	..	60 "
Chosen and domestic	..	..	..	50 "



Bird's Eye View of Mitsubishi Kenjiho Iron and Steel Works

Therefore for one ton of iron there is required 1.649 tons of the mixed ores. The average cost of these ores at Yawata in 1930 was about Y.9.00.

Accordingly we have

Iron ore (Y.9.00 by 1.649)	..	Y.14.84
Coal (1.6 tons per ton of coke at Y.9 a ton)	..	14.40
Slag : Limestone, 1/5 ton at Y.6.00 per ton	..	1.20
		Y.30.44
Power	..	say Y. .30
Wages	..	3.85
Administrative expenses : salaries, etc.	..	1.60
Office, materials, etc.	..	.12
Taxes : None		
Total	..	Y.36.31

In this estimate there is no allowance for depreciation. This can be estimated roughly at Y.2.41 per ton so that the total cost is something like :—

		Y.36.31	
		2.41	Depreciation.
Total	..	Y.38.72	
Less subsidy	..	6.00	
		Y.32.72	

It is impossible to make any reasonable estimate of the amount which should be allowed for depreciation. No statement of the investment in the Yawata plant has been published since 1926. when it totalled Y.130,547,201. At 4 per cent even, the annual depreciation charge should be Y.5,221,688.04. The allotting of this amount to the production of pig-iron is a matter that only an expert can determine, but for the mere argument the depreciation has been taken on a basis of charging an equal amount on each ton of all kinds of material produced, no allowance being made for the delicacy of apparatus, or operations involved.

The Yawata works use iron ore from the Tayei and Tao Chung mines, the Straits Settlements, from Chosen and from its own ore reserves in Niigata Prefecture. Coal comes from its own mines. and from imports from China and Manchuria. Limestone is quarried in its own properties in Oita and Fukuoka Prefectures. The cost of limestone is said to be cheaper in Japan than in any other steel producing country.

In July, 1930, the Yawata Steel Works employed 18,000 men a day. These produced on an average of 3,000 tons of finished materials a day. The average wage is about Y.2.50 a day (According to the Ministry of Railways, Bureau of Research). This means a labor cost of Y.15 a ton for finished steel materials. This is about twice the labor cost in private plants where the laborers are worked to death at small wages.



Water Approach to Mitsubishi Kenjiho Iron and Steel Works

In its own blast furnaces the Yawata Steel Works has produced the following amounts of pig-iron :—

1917	..	304,618 kilo tons	1924	..	424,545 kilo tons
1918	..	271,578	1925	..	456,289
1919	..	281,135	1926	..	532,908
1920	..	242,908	1927	..	540,573
1921	..	307,263	1928	..	650,573
1922	..	400,826	1929	..	646,267
1923	..	440,893	1930	..	650,380

The Yawata Steel Works, Investigation Department, published in 1929, the following figures concerning the profits made by the works since 1918.

Year	Production Kilo tons	Profits	Per ton
1918	..	Y.57,727,296	Y.184.10
1919	..	5,094,823	17.73
1920	..	14,743	0.05
1921	..	9,122	0.03
1922	..	13,478	0.03
1923	..	438,498	0.93
1924	..	866,772	1.75
1925	..	1,357,803	2.07
1926	..	2,009,279	2.71
1927	..	4,847,373	5.83
1928	..	15,425,967	16.46
1929	Not reported		
1930	Not reported		

Another 500 ton blast furnace is being installed at Yawata, and will be completed in 1931. When it is blown in some of the smaller and older furnaces will be damped down and dismantled.

Toyo Seitetsu K.K.

The Toyo Seitetsu K.K. (Oriental Steel Works, Ltd.) was established in November, 1917, with a capital of Y.30,000,000. This is to-day Y.36,000,000, of which Y.30,000,000 is paid in.

It is largely controlled by the most important financial groups in the country. The Nippon Sangyo K.K. owns 154,000 shares : the Yasuda Hozensha 12,225, and the Mitsui Gomei Kaisha and the Mitsubishi Goshi Kaisha are both shareholders.

It was originally intended that the company should manufacture not only pig-iron, but steel materials as well. Its main business, however, was to be the production of 170,000 tons of pig-iron a year. This pig was to be used in the company's own mills up to 50 per cent of production : the rest to be sold in the market.

Planned in the boom times, when operations were commenced prices were down to such a level that the company could not operate without



Another View of Mitsubishi Kenjiho Iron and Steel Works

incurring heavy losses. The completed mill was therefore leased to the Yawata Steel Works, at an annual rental of about Y.300,000. The company itself does nothing except issue reports to shareholders and pay a dividend of 1 per cent a half year on its paid-in capital.

The present equipment and capacity are :—
1—200 ton furnace : capacity 72,000 kilo tons
1—300 " " " 108,000 " "

Total annual capacity : 180,000 tons.

This company has no future unless the national policy is so defined that it can be incorporated into some merger of all the steel companies, to be made at some still very indefinite date. Unless this is done it is inevitable that it must go into liquidation. The economic condition of Japan cannot continue to bear the strain of supporting such companies as this.

The pig-iron produced in this mill is not sold on the market. The Yawata Steel Works uses it all to produce finished steel materials.

Production of pig-iron in the Toyo Seitetsu works at Tobatta, Kyushu, has been :—

1919	..	20,264 kilo tons	1925	..	99,713 kilo tons
1920	..	34,219 "	1926	..	107,331 "
1921	..	47,169 "	1927	..	161,791 "
1922	..	52,730 "	1928	..	186,322 "
1923	..	50,409 "	1929	..	141,099 "
1924	..	52,550 "	1930	..	189,985 "

Nihon Seiko Sho K.K.

This company was established in 1907 with a capital of Y.30,000,000, all paid-in. The Hokkaido Tanko Kisen K.K. (A Mitsui subsidiary) owns 29,350 shares, the Vickers-Armstrong Co., 14,600, the Mitsui Kozan K.K. 7,500, and the Mitsui Gomei Kaisha, 7,350 of the total issue of 60,000 shares. There are only 23 shareholders.

It operates a blast furnace at Wanishi near its steel works in Muroran. The steel works are primarily concerned with the manufacture of materials for the Army and Navy Departments. The company owns its own iron mine at Kuttchan, the ore having an iron content of 45 to 55 per cent. It also used at one time iron sands of which it owns large deposits. But its ore deposits are not sufficient to meet its needs, so it imports directly from China and Chosen.

The blast furnace equipment is

- 1—180 tons
- 2—120 "
- 1—100 "

the rated capacity of these being 176,800 tons a year.

Coal is bought from the Mitsui-owned Yubari mine, and converted into coke at the furnace site.



Casting Side of Open Hearth Furnaces, Kenjiho



Portions of Mitsubishi Kenjiho Iron and Steel Works

Production of pig-iron has been :—

1917	..	44,998 kilo tons	1924	..	47,183 kilo tons
1918	..	82,866 "	1925	..	73,439 "
1919	..	116,242 "	1926	..	94,629 "
1920	..	101,190 "	1927	..	92,204 "
1921	..	40,444 "	1928	..	109,543 "
1922	..	41,603 "	1929	..	117,135 "
1923	..	40,564 "			

Kamaishi Kozan K.K.

This company, the Kamaishi Mine Co., Ltd., was organized in March, 1917, a war baby. Its capital is Y.20,000,000, all paid-in. There are only 23 shareholders of its 200,000 shares. The controlling interest is held by the Mitsui Mine Co., with 179,800 shares.

It has never been particularly successful financially despite its backing, and the fact that it owns some very good coal mines, and the fact that it obtains other coal at low prices from the Mitsui mines in the Hokkaido.

It owns the following blast furnace equipment :—

- 1—250 ton furnace
- 1—200 " "

Production of pig-iron has been :—

1917	..	59,285 tons (kilo)	1924	..	54,271 tons (kilo)
1918	..	64,700 "	1925	..	47,443 "
1919	..	61,180 "	1926	..	64,615 "
1920	..	47,865 "	1927	..	67,683 "
1921	..	36,563 "	1928	..	75,737 "
1922	..	35,508 "	1929	..	98,901 "
1923	..	56,247 "			

Since early in 1930 the 250 ton blast furnace has been shut down.

Asano Zosenjo K.K. Steel Manufacturing Department

The Asano Shipbuilding Co., Ltd., was first established during the war years. The Asano Steel Manufacturing Co., was established later to roll plates for the shipbuilding company. The two companies were merged in 1920. The steel company has since been called the Steel Manufacturing Department of the shipbuilding company.

In 1927 a blast furnace was installed with a capacity of 150 tons, rated capacity a year 51,000 tons.

Ore is bought from China, and coke from a subsidiary of the Asano family interests, the Kanagawa Coke Co., Ltd. The ore is hematite, assaying 60 per cent or more of iron. Most of the pig-iron produced is used in the company's



View of Steel Works from East, Kenjiho

own steel plant, but some finds its way to the market in eastern Japan.

Production has been since 1927 as follows :—

1927	..	..	..	..	22,164 tons
1928	..	..	..	..	54,890 ..
1929	..	..	..	..	62,506 ..

These five companies all produce pig-iron in blast furnaces using coke as fuel. Production of pig-iron in charcoal burning furnaces is practically finished in Japan. Only a few very small makers use them. Production since 1924 has been as follows :—

1924	..	..	..	..	270 kilo tons
1925	..	..	..	..	153 ..
1926	..	..	..	..	— ..
1927	..	..	..	..	— ..
1928	..	..	..	..	381 ..
1929	..	..	..	..	2,000 ..

Since 1923 there has been no production of pig-iron from iron ore in the electric furnace in Japan. In that year the Nihon Soda Company with nine furnaces ceased producing pig-iron.

Remelted Pig-iron

During the war there was a considerable production of pig-iron in blast furnaces from old materials. But this dwindled to nothing in 1929.

There is to-day a growing production of pig-iron in the electric furnace using old and scrap materials. The principal makers of this class of pig-iron are :—

- Azuma Seiko K.K. (Azuma Steel Co., Ltd.)
- Tobatta Imono K.K. (Tobatta Castings Co., Ltd.).

The Azuma Seiko K.K. is a new company which first began production in 1929. It then produced 2,898 tons of pig-iron in the electric furnace. (Its address is Azuma Machi, Tokyo Prefecture).

The Tobatta Imono K.K. is an old established company belonging to the Kuhara interests. It manufactures all kinds of castings, etc., and produces its own pig-iron in its own electric furnaces.

This company owns two mills, one in Osaka, the other in Tobatta, Kyushu.

Production in these mills has been :—

(In Kilo tons)

Year	Osaka Mill	Tobatta Mill	Total
1922	..	1,091	1,091
1923	..	2,943	2,943
1924	.. 1,835	2,973	4,808
1925	.. 3,228	3,686	6,914
1926	.. 3,162	6,236	9,398
1927	.. 4,063	2,973	10,637
1928	.. 6,795	6,574	13,963
1929	.. 8,550	7,481	16,031

Other makers have produced in the electric furnace the following amounts of pig-iron :—

1923	..	..	..	36 kilo tons
1924	..	..	..	52 ..
1925	..	..	..	89 ..
1926	..	..	..	498 ..
1927	..	..	..	173 ..
1928	..	..	..	256 ..
1929	..	..	..	209 ..

Sponge Iron

For a time two and three years ago there was much talk about a very ambitious project to utilize the enormous deposits of iron sand at Kuji, Iwate Prefecture. This was a project of the Tokiwa Company of Tokyo, owned by the now bankrupt Matsukata interests. The sands contain magnetite and limonite particles, and the iron content is anything from 23 to 60 per cent. However, the ore contains a very large amount of TiO₂ (titanium dioxide), and it is very difficult to extract. In fact it has not yet been satisfactorily accomplished.

The method of extraction used is that called the Anderson-Thornhill. The finished product is made into briquettes. But so far the problems of production have not yet been solved. The titanium content carries into the finished product, and this makes it hard to use. Production was never very large, and it is gradually decreasing.

As a matter of fact with cheap iron ores coming from abroad, Japan is in no way under the necessity of developing these iron sand deposits at this time. Perhaps some future emergency will find this Tokiwa Company's plant of the greatest value.

Production of spone iron in all Japan has been as follows :—

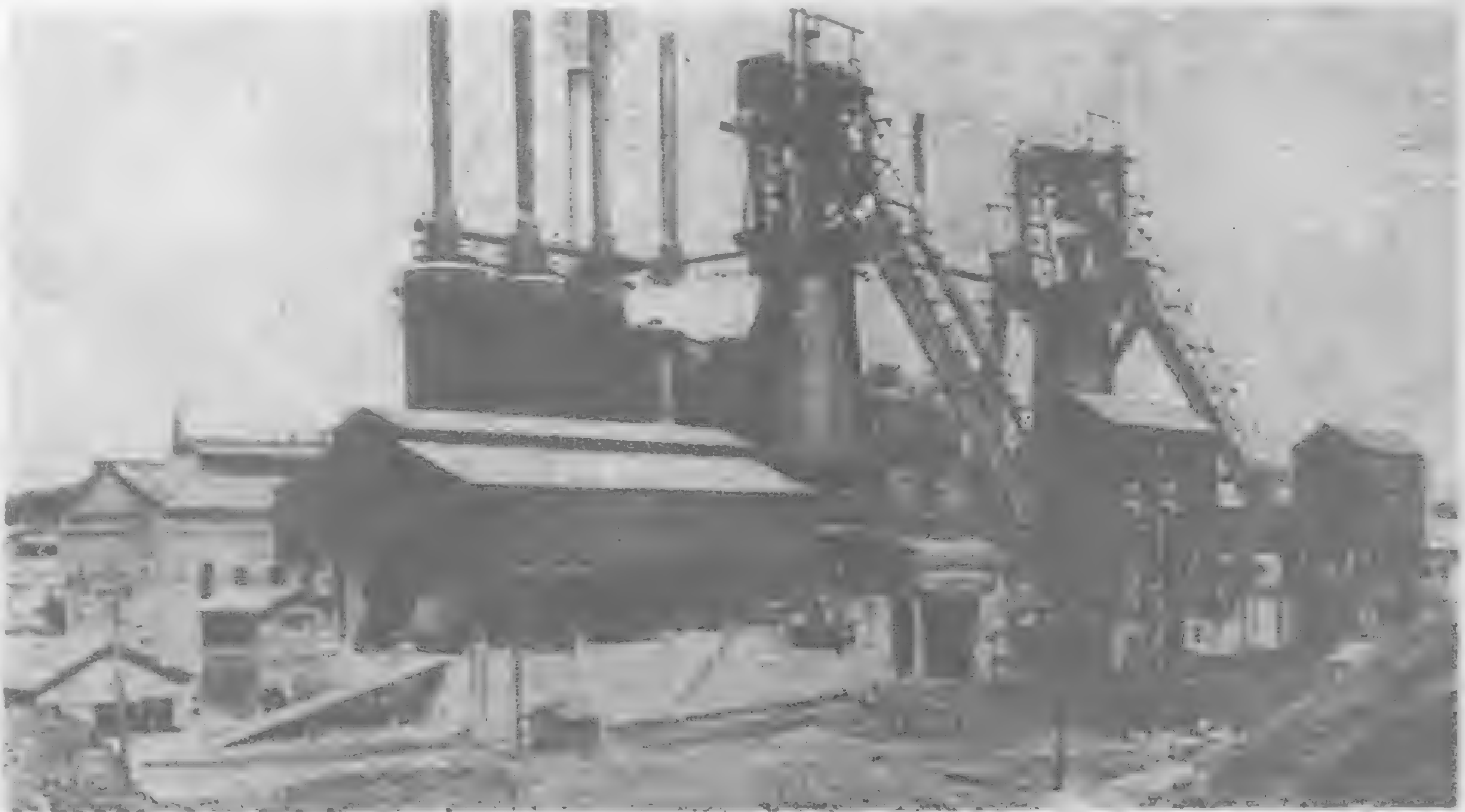
1927	..	..	..	..	925 kilo tons
1928	..	..	..	..	853 ..
1929	..	..	..	..	82 ..

This does not look exactly like a growing industry.

Recapitulating, the total production of pig-iron by all methods of production in Japan, from 1923 to 1929 inclusive, has been as follows :—

(Production of Pig-iron in Japan Proper)

Year	From Ore		(Kilo Tons)		Remelted		Total
	Blast Furnace	Electric	Sponge	Blast	Electric		
	Coke	Charcoal		Furnace			
1923	588,113	—	—	5,139	6,446		599,698
1924	578,549	270	268	1,885	5,079		586,051
1925	676,879	153	—	1,143	7,003		685,178
1926	799,483	—	—	245	9,896		809,624
1927	884,341	—	—	925	10,810		896,171
1928	1,077,065	381	—	853	14,219		1,092,536
1929	1,065,908	2,000	—	82	19,138		1,087,128



Blast Furnace Plant, Kenjiho

Pig-iron Production in Chosen

The Mitsubishi Seitetsu K.K., (Mitsubishi Iron & Steel Co., Ltd.) is the only steel producing company in Chosen. It is capitalized at Y.25,000,000, all paid-in, and is closely controlled by the Mitsubishi interests. There are only 18 shareholders, and the Mitsubishi Goshi Kaisha owns 439,500 of its 500,000 issued shares.

The company owns mines at Kenjiho, Kokaido, Chosen. It operates two blast furnaces of 150 tons capacity each, rated annual capacity 150,000 tons. In its coke department it has seventy-five Wilputte ovens, each 39-ft. 5-in. long; 10-ft. 5½-in. high; and 17 -¾-in. mean width: total annual coking capacity 166,000 tons.

Production of pig-iron has been as follows:—

1918	..	42,698 kilo tons	1924	..	99,795 kilo tons
1919	..	78,384 "	1925	..	99,160 "
1920	..	84,118 "	1926	..	115,036 "
1921	..	83,010 "	1927	..	129,022 "
1922	..	83,179 "	1928	..	146,159 "
1923	..	99,933 "	1929	..	153,627 "

The pig-iron which this company produces is sold in Japan, and for the time its steel plant equipment is not being used.

Pig-iron Production in Manchuria

In South Manchuria the South Manchuria Railway Co., owns and operates the Anshan Steel Works, which are situated in the midst of the Anshan iron field about 200 miles north of Dairen on the main line of the railway.

The principal mine in the district is reported to have a reserve of 100,000,000 tons of low grade ore. The ore is not easily reduced, and though very elaborate and ambitious plans have been made to exploit these fields, so far results have not been in accordance with the plans.

The ore is concentrated to 58 per cent and then used. This makes the process of utilization a difficult and expensive one.

Two 250 ton blast furnaces originally built have been reconstructed to a capacity of 300 tons each, and their rated annual capacity is now 280,000 tons.

A 500 ton furnace planned for completion in 1930 has been indefinitely postponed.

The Showa Steel Works which was planned to take over the Anshan Works some years ago is still not in operation. Machinery purchased with the view of making this the most important iron and steel works in the Orient eventually, has been lying on the docks at Dairen for a year and more. No effort is being made to use it, and no one seems to know just when it will be erected.

Besides the technical difficulties of using the Manchurian ore, there are jealousies of Japanese makers to be met before the industry can be developed to any great extent. The development of a modern steel industry in Manchuria is looked upon with jealousy and suspicion in Japan. Under any circumstances the products of such an enterprise must pay both export duties from China and import duties into Japan, unless its products are to be marketed in the other countries of the Far East. And it seems unlikely that the Japanese makers will permit any such competition with their hot desire to enter the export market of the Far East in competition with the whole wide world.

Production of pig-iron at the Anshan Works has been:—

1923	..	73,461 kilo tons	1927	..	192,895 kilo tons
1924	..	81,594 "	1928	..	220,637 "
1925	..	85,886 "	1929	..	217,859 "
1926	..	146,327 "			

The other producer of pig-iron in Manchuria is the Honkeiko Baitetsu Koshi. This is a joint Chinese-Japanese capital undertaking, in which the Okura financial interests are concerned. The company operates two 130 ton blast furnaces, with a rated capacity of 88,400 tons a year.

Production has been since 1923 as follows:—

1923	..	24,388 kilo tons	1927	..	51,308 kilo tons
1924	..	52,782 "	1928	..	64,038 "
1925	..	50,799 "	1929	..	77,521 "
1926	..	51,816 "			

Total production of pig-iron in Manchuria has been as follows:—

Year	Anshan	Honkeiko	Total
1923	73,461
1924	81,594
1925	85,886
1926	146,327
1927	192,895
1928	220,637
1929	217,859

It is now possible to give the total production of Pig-iron in all Japan and the Japanese Possessions.

PIG-IRON PRODUCTION IN ALL JAPAN

Year	Japan	Chosen	Manchuria	Total
	(Kilo Tons)			
1917	408,901	408,901
1918	419,144	461,846
1919	479,181	557,565
1920	426,177	510,295
1921	431,439	511,449
1922	530,267	613,446
1923	588,113	785,895
1924	578,549	812,720
1925	676,879	912,624
1926	799,483	1,112,662
1927	884,341	1,257,566
1928	1,077,065	1,507,899
1929	1,065,908	1,514,915
1930	1,656,170

Imports of Pig-iron

Despite this high production of pig-iron in Japan, Japan is obliged to import a very large amount every year in order to keep its steel-mills operating.

The principal import is from British India, and the cheap pig-iron from this country has caused the Japanese makers much uneasiness. Competition has been difficult because of the high cost of ore and coal in Japan. But in the last two years the Japanese makers have been able to hold their own. The propaganda to limit buying of all foreign goods during 1930 materially affected the purchases of Indian pig-iron that year. It is not at all improbable that the next five to ten years will see a complete stoppage of imports of pig-iron from all sources. This, however, will depend largely on the development of the Straits Settlements mines, and the smooth shipments of ores from the Chinese mines.

Imports of pig-iron into Japan from all sources since 1921 have been as follows:—

1921	..	276,284 tons (Kilo)	1926	..	508,412 tons (Kilo)
1922	..	409,606 "	1927	..	580,670 "
1923	..	429,442 "	1928	..	712,734 "
1924	..	520,122 "	1929	..	794,861 "
1925	..	402,568 "	1930	..	400,819 "

Imports of Pig-iron by Country of Origin

(Kilo tons)

Year	China	England	Germany	Sweden
1921	76,160	22,628
1922	129,274	9,726
1923	97,630	6,365
1924	165,219	7,809
1925	47,822	8,185
1926	3,796	7,595
1927	5,849	6,727
1928	30,748	8,397
1929	56,836	9,134

Year	United States	British India	Others	Total
1921	1,247	34,351	71,197	227,092
1922	1,245	100,656	78,503	327,970
1923	25	136,929	104,422	346,033

Year	United States	British India	Others	Total
1924	31	159,978	94,422	346,033
1925	86	153,332	103,265	316,359
1926	102	227,628	160,281	399,640
1927	102	261,130	194,676	472,947
1928	27,766	310,489	183,533	569,214
1929	30,474	411,477	140,424	654,055

The following table gives the supply of pig-iron in Japan from 1921 to 1929, after allowing for all deductions for exports to the Japanese possessions. There are no exports of Japanese pig-iron to other countries, yet.

(Kilo tons)

Year	Production	Imports	Total	Exports to Colonies	Balance supply	Production per cent of supply
1921	480,300	276,284	756,584	5,768	750,816	64
1922	559,310	409,606	968,916	5,282	963,634	58
1923	610,751	429,442	1,040,193	5,321	1,034,962	59
1924	599,029	520,122	1,119,151	7,270	1,111,881	54
1925	696,720	402,568	1,099,288	6,503	1,092,785	64
1926	821,832	508,412	1,330,244	4,686	1,325,558	62
1927	912,183	580,670	1,492,853	4,325	1,488,528	61
1928	1,109,627	712,734	1,822,361	4,904	7,817,457	61
1929	1,113,463	794,861	1,908,324	3,771	1,904,553	58
1930		estimate			1,602,989	

But taken as a whole the Japanese pig-iron production is only a drop in the bucket of world production, as this next table shows :

World Pig-iron Production

Country	(Thousands of Kilo tons)		(Kilo tons)	
	1929	1928	1927	1926
United States	43,078	38,437	36,869	39,727
Canada	1,188	1,100	772	788
England	7,686	6,716	7,410	2,469
France	10,454	9,978	9,296	9,429
Belgium	4,099	3,904	3,751	3,399
Luxembourg	2,895	2,769	2,722	2,512
Italy	685	508	494	513
Spain	731	579	593	457
Sweden	508	437	455	456
Germany	13,512	11,800	13,099	9,641
Hungary	477	458	434	388
Portugal	365	285	298	188
Czecho-Slovakia	1,625	1,539	1,260	1,088
Poland	712	683	616	327
Russia	4,064	3,375	3,032	2,426
The Saar	2,108	1,935	1,770	1,625
British India	1,371	1,068	1,163	914
Australia	457	416	431	449
Japan	1,562	1,540	1,285	1,135
Others	568	548	406	331
Total	98,145	88,075	86,156	78,282

Table from : *Seitetsu Gyo Sanko Shiryo*

June, 1930 : Page 84.

Japan's total production in 1929 was 1.59 per cent of the world total.

Sales of pig-iron in Japan are handled by a joint sales association which also has a great deal of authority in regard to the quantity each member shall produce from time to time. This organization is known as the Sentetsu Kyodo Hambai Kumiai, and its head office in Tokyo is in the Marunouchi building.

Members of this association are the principal manufacturers of pig-iron in Japan, the Kamaishi Kozan K.K., Nihon Seiko Sho K.K., Mitsubishi Seitetsu K.K., the Anshan Steel Works of the South Manchuria Railway and the Honkeiko Baitetsu Koshi. The pig-iron produced by the Yawata Steel Works, and in the Toyo Seitetsu K.K. mill by the Yawata Steel Works, does not appear on the market, so these makers are not members of this guild. The Asano Zosenjo Steel Department is also not a member. It uses most of its own product in its steel rolling mills.

This guild fixes prices of pig-iron, and arranges for pro-rata sales through appointed agents, who handle sales at wholesale, and for this they are paid a commission.

Subsidy for Making Pig-iron

A subsidy is granted to producers of pig-iron having an annual output of more than 35,000 tons a year. A subsidy of six yen a ton is granted if the maker uses this pig-iron in rolling steel. If sold to others for making steel the subsidy is five yen a ton ; and for pig-iron not used in rolling steel the subsidy is only three yen a ton.

The existing tariff on pig-iron is 10 sen per 100 kin, or Y.1.66 per metric ton. Iron ore and scrap iron are duty free.

The cost of producing a ton of pig-iron at the Yawata Steel Works was estimated at Y.38.72. If this subsidy of Y.6 is granted to the Yawata Steel Works, and it probably is, then the cost should be reduced to Y.32.72.

In the following table compiled by Yawata Steel Works, Investigation Department, all the potential manufacturers of pig-iron are included with the present operating companies.

Company	Rated Capacity		Production First Half 1930	
	K. Tls.		K. Tls.	
Mitsubishi Seitetsu	110,000		74,338	
Nihon Seiko Sho	168,000		61,236	
Kamaishi Kozan	177,000		48,245	
Asano Zosenjo	55,000		28,928	
Nihon Kokan	25,600		—	
Kobe Seiko Jo	7,300		—	
Asano Kokura Seiko Jo	14,600		—	
Anshan Works	219,000		123,326	
Honkeiko Baitetsu	110,000		50,353	
Total	886,500		386,426	
Yawata Steel Works and Toyo Seitetsu	814,200		407,541	
Grand Total	1,700,700		793,967	
Imports			236,385	
Total supply, 1st half 1930			1,030,352	

(To be Continued)

Chinese Wood Oil

It is now two years since the Chinese Government formally promulgated regulations drawn up by the Ministry of Industries for the establishment of a service for the organized and systematic inspection of goods intended for export. The first Inspection Bureau to be opened was that in Shanghai, which commenced operations in March, 1929. In the following month a bureau was opened in Hankow, and in July of the same year similar institutions were established at Tientsin and Tsingtau, making four in all. A phase of the work of the Shanghai Bureau is the Department of Chemistry, which in 1930 undertook to supervise the regulations enforced by the Government relating to the export of tung oil, in consequence of complaints, and in view of the growing competition from the United States as a source of supply. The standards established by the Bureau, to which all consignments must conform, are designed to improve the colour, appearance, and quality of tung oil. The Chinese product, when unadulterated, compares favorably with the best quality of tung oil produced in Florida, but the dishonest admixture of oil from tea, cotton, rape and other seed has the effect of spoiling its clear, yellowish-green color and very high refractive index. It is with a view to checking this unfavorable tendency by preventing adulteration, that the Bureau carries out its laboratory tests of all consignments of tung oil intended for shipment abroad, and only those which pass analysis for specific gravity, refractive index, and acid, saponification, iodine, and heat numbers are permitted to leave the country with a certificate of quality which is accepted in any part of the world.— *Chinese Economic Journal*,

Aircraft Construction in the Chinese Navy

By Captain Y. K. Tseng in Collaboration with Harrison Forman

UNtil quite recent years China has been an almost totally non-manufacturing country. It is only in the last decade or so that she has begun to enter the self-productive field. This activity has been stimulated by the awakening of national consciousness since the Revolution in 1911. Without a background of accumulative years of experimental and research work in the evaluation and use of home products, China, of necessity had to content herself at the first with simple establishments for the assembly of the segregated foreign-made parts into the finished, still essentially foreign-made, whole. Though progress is necessarily slow owing to protracted unsettled conditions in the country, the time is fast approaching when China will become quite self-reliant in the production of the manufactured article from the wealth of diversified raw material at her command.

The construction of aircraft was more or less in the experimental and novelty stages up to the outbreak of the World War in 1914. The War gave the airplane a chance to prove its potential practicality. Under pressure of extreme necessity greater development in the flying machine took place in the few short years of the War than in the score of years or so preceding.

It was not until the final year of the War that China took an active interest in the construction of aircraft. Under the supervision of the Chinese Navy the Naval Air Establishment was created in the spring of 1918 with headquarters at Foochow in the province of Fukien. Four well-trained men were placed in charge of the administration of the establishment and the design and construction of aircraft. These men were Lieutenants (now Captains) Y. T. Barr, (Barr Yu-tsao), Y. K. Tseng (Tseng Yee-king), T. Wong (Wong Tsou) and S. F. Wong, Lt. S. F. Wong resigned in 1921. All of these men besides having had an early training at home, had obtained extensive technical and aeronautical experience abroad, especially in England and America.

In order to save time and the initial cost for the erection of a new plant and the installation of new equipment suitable for the work contemplated, a part of the Navy-owned Government Dock and Engineering Works, commonly known as "Foochow Dock," was allotted to the N. A. E. for its start. This included offices and workshops with some general metalworking and woodworking machinery. General office staff, draftsmen and workmen were at first selected from the personnel of the Government Dock and Engineering Works; these were later replaced by men specially trained at the N. A. E. Machinery, machine tools and factory buildings special to the construction of aircraft were added from time to time as required. Such jobs as casting, electro-plating, galvanizing, etc., which did not justify costly installations of equipment owing to the limited amount of such work required were done by the "Foochow Dock."

Experimental and Research Work

Up to 1917 China had little or no experience in the construction of aircraft, and the engineers in the N. A. E. were therefore confronted at the outset with a dearth of scientific information on such home products as were of likely value in aeroplane construction. As it was the intention of the officers to make as much use of home products as possible, the first thing done before actual construction began was then to carry out tests and research work in order to discover materials which would have the same or equivalent qualities, properties and strength of those that had been found to be suitable and were in common use in the aeronautical industry abroad. In doing this, the question of supply had also been kept in mind. It

was desirable that the materials should be easily procurable in the local market.

TIMBERS.—Some ten species of Chinese soft and hard woods were tested according to the best scientific standards. *Shanmu* (*Cunninghamia lanceolata* Hooker) which abounds in the mountain forests of Fukien was found to possess qualities about equal to those of Grade A spruce as specified by the British Engineering Standards Association. This timber has since been used extensively in the construction of main strength members such as wing spars, fuselage, longerons, etc. Indigenous elm (*Ulmus parvifolia* Jacq.) has mechanical properties similar to American rock-elm and has been mainly used in the construction of seaplane floats and flying-boat hulls. Camphor wood (*Cinnamomum Camphora* Nees et Ebermaier), and especially its roots, on account of its toughness, fineness and natural crookedness of grain and great shearing strength has proven most valuable in the making of knees or bracing members and gusset plates in the construction of floats, hulls and Warren girder type of fuselages. This wood is a special product of South China. Baili and Nanmu (*Machilus ichangensis* Rehd et Wils.) also on account of their toughness and fineness of grain have been used on minor parts of airplanes.

FABRIC.—Of the different kinds of silk, cotton and ramie or grass cloth tested Shantung silk and Kiangse ramie cloth were found up to the strength required. A quantity of these two kinds of fabric is manufactured by the mills to the special specifications of the N. A. E. and is used for wing and fuselage coverings. Shantung silk, however, has a tendency to lose its tautness under abnormally humid atmospheric conditions. As these conditions were rather prevalent in the late spring and early summer in Foochow the use of this fabric on those machines which chiefly operated locally was discontinued.

DOPE.—Climatic conditions also affected two kinds of dope which were formulated and used after a great deal of experimental and research work. These were later replaced by imported dopes which were known as P.D.N. 12, a pigmented nitro-cellulose dope, and V.84, an aluminium nitro covering. Three coats of the pigmented dope and two coats of the aluminium dope proved very well suited to the semi-tropical climate at Foochow and never gave trouble.

VARNISH AND LACQUER.—For the protection of wood in internal work such as wing frames, fuselages, interiors of floats and hulls

a varnish made at the N.A.E. with Tung oil as its chief ingredient has been employed with satisfactory results. It exceeded all the requirements as laid down in the B.E.S.A. specifications. Specially treated varieties of Foochow lacquer, which is world famous, has been successfully used for protection against weather on all external woodwork, against fouling on float and hull bottoms and against corrosion on steel fittings. Apart from its engineering value, lacquer is valuable in that it can be finished in any color scheme desired and gives a brilliant and perfectly smooth surface which not only reduces air resistance but is also most pleasing to the eye. When properly treated and skilfully applied it is very light in weight and has absolutely no tendency to chip.

Aircraft

Since its establishment in 1918 the N.A.E. has produced altogether five distinct types of seaplanes and flying-boats ranging from training machines to bombing and torpedo planes. Owing to financial limitations, however, only 12 machines were constructed at Foochow. As the operations of the Navy are all on the water and, furthermore, as there were no landing fields or airdrome



Captain Y. K. Tseng—Director-General the Naval Air Establishment, Shanghai

available near Foochow, no land machines were constructed; although some designs for landplanes were worked out.

The first type of machines designed and constructed were training seaplanes. Their chief features were low landing speed, good stability and controllability and robustness of construction. They were designed to meet the rough usage and strain of student training.

Type "Char"

This was designed for primary training. The first machine of its type was completed towards the end of 1918. It was a tractor biplane with twin-float arrangement for undercarriage. The wings and tail surfaces were of Shanmu and silk construction. Interplane bracing was effected by two pairs of streamline Shanmu struts on each side of the fuselage, together with high tensile steel bracing cables. Two seats in tandem were provided in the fuselage which was of the orthodox wire braced construction; the longerons and struts being of Shanmu and the bracing of steel wires. The floats were of streamline form and had V-bottoms. Keels and chines were of elm and frames of Shanmu. The skins of the floats were planked by two plies of narrow thin strips of Shanmu. The two plies were laid at right angles to each other, each ply being at about 45 degrees with the fore-and-aft axis. Between the two plies of planking there was a layer of fabric impregnated with waterproof marine glue to ensure watertightness and strength. Each float was divided into five watertight compartments, and was designed with 100 per cent reserve buoyancy.

This machine was powered with an 8-cylinder B-type water-cooled Curtiss engine developing 100 horse-power at 1,400 revolutions per minute. Its high speed was 75 miles per hour and landing speed 35 miles per hour.

TYPE "YEE."—In general construction this type was similar to type "Char" except that the wing area was smaller and the high speed and landing speed were increased to 90 and 40 miles per hour respectively. This type was designed for use by students after they had mastered type "Char." It was fitted with a 4-cylinder vertical water-cooled Hall-Scott engine, the power and speed of which were the same as the Curtiss engine. It has two side radiators, one mounted on each side of the fuselage and slightly behind and above the engine, whereas in type, "Char," a nose radiator was fitted.

Both type "Char" and "Yee" were designed to a minimum load factor of eight and their loaded weight was about the same, viz., 2,100 lbs. The range for each was three hours, flying at high speed near sea level. As at first constructed, the gasoline tank was installed under the student's seat. Feed to the engine was therefore by pressure. On later machines, the tank was mounted in the top center section. Feed was hence by gravity, thereby not only weight and work were saved, but, most important of all, frequent troubles incidental to the pressure system were eliminated.

TYPE "BEENG."—This was a tractor biplane flying boat designed for bombing and fighting, but, if desired, with slight modifications it could be adapted to passenger carrying. As a bomber and fighter it carried a crew of three, a pilot and two gunners. The pilot's cockpit was situated in the hull of the boat a little to the front of the leading edge of the lower wing, where the pilot had an unobstructed view forward, side-



(Left to right)—Captain Y. K. Tseng (present Director-General of the N.A.E.) Captain Y. T. Barr and Captain T. Wong, standing before the Type "WU" (built in 1927)

ways and downward. The first gunner's cockpit was at the extreme bow of the boat while that of the second gunner was behind the main wings. Both gunners were provided with machine-guns mounted on Scarff rings by means of which the guns could be swung in any direction desired. With the guns thus located the field of firing was covered in nearly all directions. The only blind spot was a small angle allowance for the tail, which was unavoidable. As fuel was contained in tanks in the upper wing, the hull space between the pilot and aft gun cockpits was free for the

stowage of bombs and machine-gun ammunition. When used for passenger carrying, four seats could be quickly installed in this space. For the comfort of passengers the sides of the hull were fitted with portholes, similar to those fitted on yachts.

The power of this flying boat was supplied by a 12-cylinder V-type water-cooled Rolls-Royce engine which developed 360 horse-power at 1,800 revolutions per minute. It was geared and the speed of the propeller was reduced to 1,080 revolutions per minute. The total weight of the plane was 6,500 lbs. Overall dimensions were—span 56 feet, length 39 feet and height 16 feet 7 inches. The hull which was of the flexible or Linton Hope type of construction was 36 feet in length.

TYPE "WU."—This was an observation or general purposes machine of 120-130 h.p. It was a twin float single bay tractor biplane. Its chief characteristics were simplicity of construction and ease of maintenance. The Type "Wu" was distinctly marked from previous types in its fuselage construction. In this fuselage, except for the engine mounting in the nose, no metal fittings or wires were employed. It was built up in the form of Warren girders, composed of four longerons of Shanmu and a number of struts of the same material. The attachment of the struts to the longerons was by means of two-ply camphor wood gussets glued and copper riveted. This construction proved very rigid and strong under bending and torsional tests and was proven entirely satisfactory in actual service. Its advantages over the ordinary braced type must be obvious since no great numbers of metal fittings, wires and turnbuckles or special forms and jigs were required in its construction, and no great constant trueing up was necessary in service.



Admiral Chen Shao-kwan, who is responsible for the establishment and development of an Aviation Division in the Chinese Navy

Three seats were provided in the fuselage, two side-by-side or "sociable" seats in the rear cockpit and one in the front cockpit, the floor of which was arranged to permit the installation of a camera for aerial photographic work or bomb sights and bombing controls. Except in the fuselage all the struts in this type of machines were made of steel tubing faired with hollow wooden tail pieces for streamlining. The engine fitted was a 3-cylinder radial air-cooled Bristol. The gross weight of this plane was 2,000 lbs. The span was 35 feet, 5 inches, overall length 26 feet and overall height 12 feet, 3 inches.

TYPE "DING."—This type of machine, one of the newest, is a bombing and torpedo plane. It is fitted with a 300 h.p. Rolls-Royce engine, but provision is made for the installation of an engine of greater horse-power when so desired. Its total weight is 5,300 lbs with a military load of 220 lbs. In its general method of construction it is similar to Type "Wu" except that the two floats are supported on separate and independent structures with clear space between them to permit a torpedo to be slung under the fuselage and launched without hindrance.

Provision is made for two cockpits and a cabin in the fuselage. The pilot's cockpit is under the trailing edge of the upper wing, where there are two side-by-side seats. Behind this is the gunner's cockpit. Between the pilot's cockpit and the engine compartment is the cabin for the bomber. This is built of generous dimensions with a trap door and bombing gear installed.

When used for passenger carrying, four persons can be comfortably accommodated in the cabin, the head room of which is sufficient for persons of normal height to stand upright. Entrance to the cabin is effected by a door on each side of the fuselage, while a third or emergency door is fitted on the roof. Large windows are fitted on both sides of the cabin affording exceptional vision.

When long distance non-stop flights are to be made, one or more large reserve fuel tanks can be installed in the cabin. The normal cruising range is six hours. Overall dimensions of the machine are: span 46 feet, length 36 feet, 9 inches and height 17 feet, 4 inches.



Left to right—Captain Y. K. Tseng, Colonel S. H. Shen, Director-General Naval Air Service, Commandant Hungjao Military Airdrome, Shanghai, Captain T. Wong, Former Director-General Naval Air Establishment, designer of "Kiang Hsu," 1931

The "Chiang Hung" Seaplane (1930)

TYPE.—Two-seat training or three-seat touring biplane.

WINGS.—Single-bay biplane. Wooden structure with wire bracing. Fabric covering. Ailerons fitted on bottom planes only. Inter-plane struts are steel tubes with wood fairings. Means are provided on top center section for hoisting aboard ships.

FUSELAGE.—Rectangular structure of wood covered with fabric. Engine mounting and forward portion of fuselage of steel tubing.

TAIL UNIT.—Monoplane type, with braced three-ply tail plane and cantilever fin. Tail plane adjustable in the air. Unbalanced rudder and elevators. Wood structure with fabric covering.

FLOATS.—Twin floats, with single steps. Chassis consists of outwardly sloping "N" struts to floats. The floats are connected together by two spreaders which are supported midway by the apices of transverse Vees from the fuselage. The spreaders are further cross-braced with cables. All the float struts are steel tubes faired with wood. Floats made of wood, with five watertight compartments, each with hand-hole.

POWER PLANT.—One 165 h.p. Wright "Whirlwind" 5-cylinder air-cooled engine. Two fuel tanks on top center section. Oil tank behind engine on top of fuselage.

ACCOMMODATION.—Front cockpit with side-by-side seats below wing. Rear cockpit behind trailing edge. Dual control is fitted in the front cockpit. When the machine is used for touring, the rear cockpit can easily be converted into a luggage compartment with a detachable cover.

DIMENSIONS.—Span (top) 10.540 m. (34-ft. 7-in.), Span (bottom) 10.880 m. (35-ft. 8-in.), Chord 1.600 m. (5-ft. 3-in.), Gap 1.600 m. (5-ft. 3-in.), Length 8.330 m. (27-ft. 4-in.), Height 3.560 m. (11-ft. 8-in.), Wing area 31.40 sq. m. (338 sq. ft.).

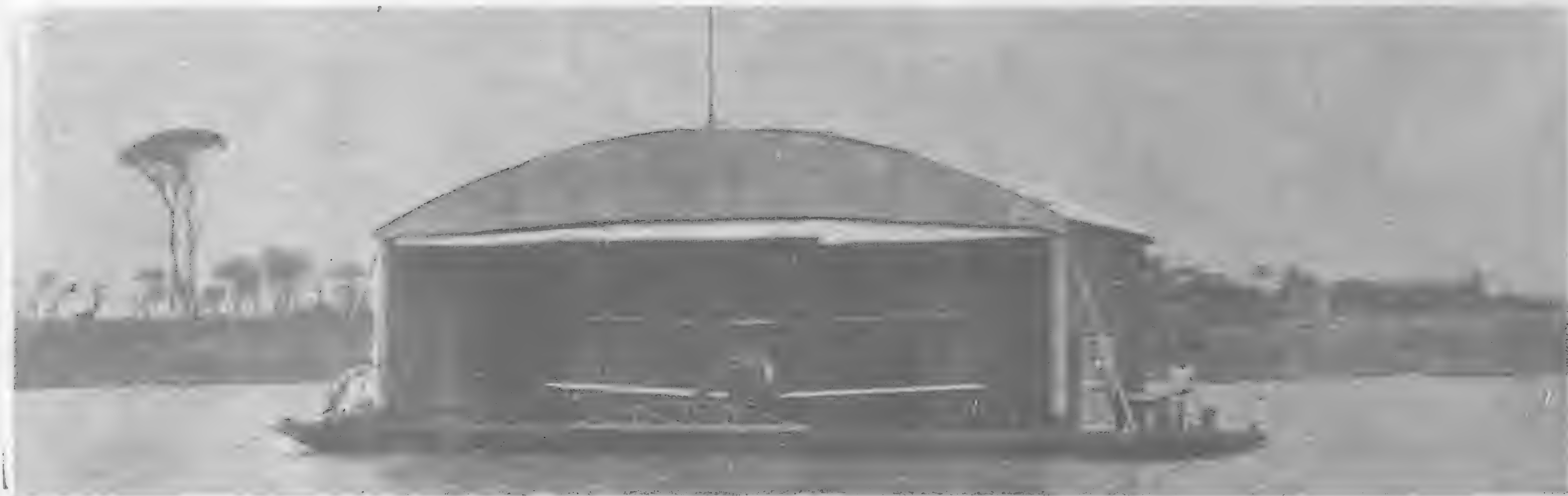
WEIGHTS AND LOADINGS.—Weight empty 740 kg. (1,630 lbs.), Disposable load 440 kg. (970 lbs.), Weight loaded 1,180 kg. (2,600 lbs.), Wing loading 37.6 kg./sq.m. (7.7 lbs./sq.ft.), Power loading 7.15 kg./h.p. (15.75 lbs./h.p.)



The "Kiang Han" at anchor



Left to right—H. Shaa, foreman motor shop, W. H. Whang, in charge float construction, K. S. Wong, assist. foreman machine shop, L. H. Chen, Draftsman, S. C. Wong, shop superintendent, P. Y. Chen, in charge airplane construction, Y. K. Tseng. Director-General N.A.E., K. L. Ling, draftsman, C. H. Wong. Superintendent motor shop, G. Y. Chen, draftsman, K. L. Ling, foreman woodworking shop, S. T. Ling assist. foreman woodworking shop, "Kiang Hau," 1931 in background



The Floating Hangar



The woodwork part of the Naval Air Establishment showing workers making floats

Chord—lower wing ...	4-ft. 4-in.
Stagger	0°
Dihederal—upper wing	3°
Dihederal—lower wing	4°
Incidence—upper wing	1.5°
Incidence—lower wing	1.5°
Tail incidence, adjustable in flight	—2.5° to + 2.5°
AREAS	
Wing incl. aileron ...	245.2 sq. ft.
Total aileron	21.0 „
Tail plane	13.1 „
Total elevator	12.3 „
Fin	5.0 „
Rudder	7.6 „
Wing section	R.A.F. 34
WEIGHTS	
Weight empty	1,660 lbs.
Useful load	800 „
Pilot	140 „
Fuel (72 gals.)	432 „
Oil (7 gals.)	53 „
Pay load	175 „
Passenger capacity	one
Gross weight loaded	2,460 „ (1,115 Kg.)

PERFORMANCE.—Max. speed 177 km.h. (110 m.p.h.), Landing speed 85 km.h. (53 m.p.h.), Initial rate of climb 156 m./min. (514 ft./min.), Climb to 3050 m. (10,000-ft.) 31 min. Absolute ceiling 4730 m. (15,500-ft.).

“Chiang Hau” Seaplane (1931)

Powered with Wright Whirlwind J-6-5 165 h.p. at 2,000 r.p.m.

PERFORMANCE WITH FULL LOAD.

High speed ...	118 m.p.h. (190 Km. p.h.)
Cruising speed ...	97 m.p.h.
Landing speed ...	56 m.p.h.
Rate of climb at sea level... ..	450-ft./min.
Climb in 10 min. ...	3,770-ft.
Service ceiling ...	9,620-ft.
Wing loading ...	10.1 lbs. sq. ft.
Power loading ...	14.9 lbs. h.p.
Cruising radius ...	715 miles (1,150 Km.)

DIMENSIONS

Length overall ...	27-ft. 0-in.
Height overall ...	10-ft. 10-in.
Wing span—upper... ..	32-ft. 2-in.
Wing span—lower	32-ft. 2-in.
Chord—upper wing	4-ft. 4-in.



A view of the huge plant of the N.A.E. at Foochow, Fukien, China



Type "Beeng."—Three open cockpits (pilot and two gunners) and cabin seating four passengers. Military bombing flying-boat or commercial passenger plane. (Rolls-Royce water-cooled 360 h.p. engine)

EQUIPMENT

Propeller (metal, adjustable) Dia. 8-ft. 6-in. Control (Dual) conventional stick and rudder bar.

Instruments :

Compass
Bank indicator
Airspeed meter
Altimeter
Tachometer
Gas Gauge
Oil press. gauge
Oil temp. gauge

Floating Hangar

Besides all the hangars and slipways which are used for housing and operating aircraft and which are designed by the officers of the N.A.E., a steel floating hangar which is unique in the fact that it is the only one of its kind in the world was constructed at the Kiangnan Dock and Engineering Works in 1922. It was designed by Captains Barr and Wong, on the principle of floating docks and was for use on the Yangtze River. Its chief features

the hull rests at its normal waterline, the flap door is closed and the bottom of the trough is above water. When it is desired to operate the seaplane, water is pumped into the flooding compartments and the hull is sunk to its low waterline ; the flap



Type "Beeng"

door is then opened and the machine is water borne and hence can easily be taxied out. Sinking or floating of the hangar is accomplished by means of a centrifugal pump driven by a kerosene engine. Overall dimensions of the floating hangar are : Length

70 feet, 8 inches, Width 35 feet, 4 inches and Height 26 feet, 6 inches. Its normal draft is 2 feet 10 inches.

A brief biography of the three men who have been responsible for the success of the Naval Air Establishment follows :

**Wong Tsao, M.Sc.,
A.F.R.Ae. S.**

Wong Tsao was born in Peiping (Peking) in 1892. He entered the Naval College at Chefoo by competitive examination in 1907. In 1909 at the age of 17 he was one of the few successful cadets selected and sent to England to study engineering by the Ministry



Type "Char."—Two place open cockpit training seaplane. (Curtiss V-type water-cooled engine developing 100 h.p.)

of Navy. For the first two and a half years in England he served as a premium apprentice in Messrs. Armstrong, Whitworth Shipyard and Hawthorn, Leslie Engine Works, both of Newcastle-upon-Tyne. In 1912 he passed into Armstrong College, Durham University where he graduated in mechanical engineering with the degree of B.Sc. in 1915. While in college he made use of the summer vacations by working in the drawing office in Vickers Naval Construction Works in Barrow-in-Furness.

In the summer of 1915 when war conditions made further sojourn in England inconvenient he was ordered to America by the Chinese Ministry of Navy for aeronautical training. Immediately upon arriving in the United States he began his flying training in the Curtiss Flying School at Buffalo, New York, and upon completing the course he entered

Massachusetts Institute of Technology and passed the post-graduate course of aeronautical engineering with the degree of M.Sc. in the summer of 1916. He was immediately engaged by the Boeing Airplane Company (then known as the Pacific Aero Products Co.,) of Seattle, Washington, as chief aeronautical engineer. Whilst there he was responsible for the design and construction of two types of seaplanes which were subsequently ordered in large numbers by the U. S. Navy.

Wong Tsou returned to China at the end of 1917, and at the beginning of 1918 was, as a member of a committee of four, sent to Foochow by the Ministry of Navy to organize the Naval Air Establishment, and concurrently to institute and instruct a course of aeronautical engineering in the College of Naval Construction. Besides administrative and other duties connected with aviation at the N.A.E. he was, together with Captain Y. T. Barr, responsible for all the aircraft designed and constructed there during the past eleven years.

In the autumn of 1928 when the N.A.E. was reorganized and a Bureau of



Skeleton of the hull for type "Beeng"



Seaplane Float.—Wood float construction as developed by the N.A.E. Indigenous elm and camphor wood used, covered with Shantung silk or Kiangse ramie cloth and Foochow lacquer



View of keel of hull for type "Beeng"

Naval Aviation was to be inaugurated at Shanghai, he was appointed Director of the Bureau with the rank of Captain; but before taking up his new office he acted for a few months for Captain Y. T. Barr, the newly appointed Director of the Naval Air Establishment, who was at the time away in Europe.

Captain Wong is a member of the Science Society of China, Chinese Engineering Society, Chinese Society of Naval Engineers, N.E.C. Institution of Engineers and Shipbuilders, England, and an Associate Fellow of the Royal Aeronautical Society with which is incorporated the Institution of Aeronautical Engineers, London.

Tseng Yee-King, B. Sc.

Y.K. Tseng was born in Foochow in 1888. He entered the Naval College at Chefoo in 1907 and was one

of a few successful cadets selected and sent to England to study engineering by the Ministry of Navy in 1909. For the first two and a half years in England he served as a premium apprentice in Messrs. Armstrong, Whitworth Shipyard and Hawthorn, Leslie Engine Works in Newcastle-on-Tyne. In 1912 he entered Armstrong College, Durham University and graduated in mechanical engineering with the degree of B.Sc. in 1915, when he was transferred to America by the Chinese Ministry of Navy.

In the United States he joined the technical staff of the Electric Boat Company of New London, Conn., specializing on Diesel engines and later became associated with the Curtiss Aeroplane and Motor Co., of Buffalo, New York, where by going through their different engine departments he gained thorough experience in the design and construction of airplane engines.

He returned to China at the end of 1917, and early in 1918 was, as a member of a committee of four, sent to Foochow by the Ministry of Navy to organize the Naval Air Establishment and concurrently to instruct aero

(Continued on page 693)



Type "Ding."—Two open cockpits and cabin seating four persons. Military bombing seaplane or passenger plans. (Rolls-Royce water-cooled 360 h.p. engine)



Type "Yee."—Two place open cockpit training seaplane. (Hall-Scott water-cooled 100 h.p. engine)



"Chiang Hung."—Three place training seaplane. (Wright "Whirlwind" 165 h.p. air-cooled engine)



Type "Ding"

The Texas Corporation—"A Youthful Giant"

Originating in the Beaumont Oil Rush of 1901, An American Local Company formed to Store and Transport Texas Crude Oil has grown to a vast International Organization

By E. W. MAYO

(Condensed and reproduced from "World Petroleum")

IN January, 1901, a human cyclone struck the sleepy little town of Beaumont, Texas. It was as wild and unmanageable as any twister that ever tore across the southwestern plains and left as much wreckage in its wake. It was started by the news that Captain A. F. Lucas, who had been drilling for oil on Spindletop, a small elevation in the prairie three miles southeast of the town, had struck a gusher, a marvellous well that flowed 50,000 bbl. a day. The well had broken out of control and for nine days its six-inch stream of oil was thrown 150 feet in the air, collecting in a lake that was one of the sights for early arrivals.

Publication of the Lucas well's performance started a heira of oil adventurers that converged on Beaumont from every part of the United States, not to mention Canada and Mexico.

Texaco's Beginnings

The men who joined the Texas oil rush were intent only on locating claims and finding oil. Beyond that their concern did not extend. Those who succeeded in getting down to the relatively shallow sands tapped at that time and in bringing oil to the surface encountered a difficulty new in their experience. They had the oil, but there was no market for it. This was a kind of oil very different from the output of the earlier Pennsylvania and California fields—a heavy base product yielding a low percentage of kerosene which was the only part having a market value. To the excited wild-catters oil was oil, but this was oil that nobody seemed to want.

Into this scene stepped a man who viewed the situation from an angle different from that of the ordinary oil seeker. That man was J. S. Cullinan, a shrewd and level-headed Pennsylvanian, one of the owners of the Petroleum Iron Works, who had gone down to Corsicana, Texas, when the first reports of oil came from that district three or four years before the breaking of the Beaumont boom. Being close at hand, Cullinan decided to step over to

Beaumont to see what was doing in the new field and with an eye to picking up some orders for tanks from the producers in the Spindletop district. He found no demand for storage tanks because there was no sale for the oil that would fill them.

Instead of accepting this situation as a defeat, as the ordinary man would have done, Mr. Cullinan looked upon it as an opportunity. Wiring to some of his friends back East he raised \$50,000, not for investment in doubtful claims, but to build storage tanks

and to fill them with oil that could be bought at an astonishingly low price, something like three cents a barrel. Thereupon was organized on March 28, 1901, the Texas Fuel Company, authorized capital \$50,000, chartered to do a general oil and pipe line business in the State of Texas. The company was an inconspicuous corporate figure even locally, but presently it underwent a slight expansion through a meeting between Mr. Cullinan and two Texans, J. S. Hogg and J. W. Swayne, who had taken an active part in the local oil development. The Hogg-Swayne syndicate held a number of claims and among its other possessions had acquired a site for a terminal at Port Arthur in southeastern Texas, including storage facilities, a partially completed pipe line and rights of way. Messrs. Hogg and Swayne were impressed by the possibilities envisioned in joining their own enterprise to that of Mr. Cullinan and his associate. After some dickering their holdings were conveyed to The Texas Fuel Company in exchange for half its stock.

At the beginning of 1902 the production of oil in the Spindletop district was running far ahead of available storage facilities, but the stockholders of the Texas Fuel Company went boldly forward in an effort to cope with the situation. The company purchased more land for its Garrison pumping station, authorized the erection of tankage sufficient to bring its storage facilities up to 787,500 bbls., pushed its pipe line toward completion and entered into negotiations for the erection of a loading dock on the Port Arthur Ship Canal. At the



Ralph C. Holmes, President of The Texas Corporation, distinguished equally as a man of High Technical Ability and as a business executive whose career forms the story of Texaco's rise to World-Wide Greatness. With his associates he developed the Holmes-Manley Cracking Process which greatly increased the recovery of gasoline per unit of crude and the daily capacity of refining units

same time it established a valuable source of future profits by entering into contracts for the purchase of Spindletop crude with a number of producers. These contracts covered periods of one to three years, and in numerous instances the life of the well, at an average price of three cents a barrel. All these activities called for more capital and on March 21, 1902, an agreement was drawn for chartering The Texas Company with a capital of \$3,000,000 to take over all properties and obligations of the Texas Fuel Company.

Even with this expansion it is doubtful whether the Texas Fuel Company or its successor, The Texas Company, would ever have cut a large figure in petroleum history except for the discovery of oil in the Sour Lake district. Sour Lake was an anemic health resort about 20 miles northwest of Beaumont. Its waters were reputed to be efficacious in the treatment of rheumatism and kindred ills, but the number of candidates for treatment was not large and the cure was not altogether prosperous. A large tract of Sour Lake land was owned by the Sour Lake Spring Company and an option on this land was held by an Irishman named Roche.

J. S. Cullinan had had his eye on the Sour Lake section. He believed that it would produce oil superior in quantity and quality to the output of the Spindletop district and he urged upon his associates the importance of acquiring control of as much as possible of the land. Roche wanted to be well paid for his option and the owners of the land felt that if their health resort was to be turned into an oil camp its loss of character could only be relieved by substantial financial rewards. After some stormy dickering The Texas Company undertook to drill three test wells and to pay \$1,000,000 for the option if oil was brought in.

At that time, it is safe to say, nobody connected with The Texas Company had ever seen a million dollars or had possessed even a considerable fraction of that amount. The task of raising such a sum for an unknown Texas corporation in an unproved field might well have seemed a hopeless undertaking. Nevertheless J. S. Cullinan was determined to be in a position to control the Sour Lake production if it panned out as he anticipated. He set about his financing operations in a characteristic way.

Over at Port Arthur where the company had started to develop what was presently to become one of the great oil terminals of the world lived a man who was widely known in Texas, though not



The Oil Gusher at Spindletop, Texas, from which The Texas Company originated

connected with its oil industry. It is perhaps not correct to say that he lived at Port Arthur for his business headquarters were in Chicago and he had reached a state of sufficient affluence so that much of his time was spent in Wall Street and Europe and Florida. But at any rate he maintained a winter home, a sort of glorified shooting lodge, in Port Arthur and occupied it at more or less irregular intervals. His name was John W. Gates.

When The Texas Company's need for a million dollars arose Mr. Gates was sojourning in Florida. To Florida Mr. Cullinan, therefore, betook himself. Upon his arrival he learned that John W. with his son Charles and a friend were engaged in the, to them, new and interesting game of golf. He followed promptly to the golf links and, between strokes, explained to Mr. Gates the glowing possibilities bound up in the future of The Texas Company, provided merely that it had a million dollars which it did not then possess. While Mr. Gates was preparing for a drive from one of the tees, Mr. Cullinan expressed the modest hope that he would provide ways of getting the money.

There was industrial history trembling in the balance. Mr. Gates took a lusty swing at the ball and then, looking up, said briefly, "I'll get it for you." And he did.

The organization of The Texas Company was confirmed by a state charter issued April 7, 1902. Of the \$3,000,000 capital \$1,650,000 was then issued. Within a year the remaining \$1,350,000 had been taken and the company boasted 119 stockholders, a group that at the present time has grown to a number over 75,000 no one of whom controls more than three per cent of the company's stock. From its very beginning The Texas Company has strikingly maintained its character as a great, independent corporation free from group control or entangling alliances.

The Texas Company never has missed a dividend. From 1902 to 1930 the company paid to stockholders over \$275,000,000 in cash dividends and over \$38,000,000 in stock dividends. Since its initial offering its financing has been done mainly by offerings of subscription rights to stockholders.

Progress in the Early Days

The first important move toward expansion taken by the Texas Fuel Company, even before its transformation into The Texas Company,



Famous "Shoestring" area north of the Company's Fee Property, Sour Lake, Texas



Holmes-Manley Cracking Units which form part of the foundation of Texaco's reputation

was in the direction of acquiring a pipe line system and a tidewater terminal, as already related. The second, taken very promptly after the change of name was adopted, was the erection of a refinery. In 1902 two asphalt stills were completed and late in 1904 four 1,000 bbl. stills were put into operation on the site which the company had acquired. The output of the plant was about 1,000 bbl. daily and it was connected by a pipe line to a loading wharf located on deep water some three miles distant. This was the nucleus of the present great Port Arthur refining plant of The Texas Company, which covers nearly 5,000 acres and has a crude oil charging capacity of 60,000 bbls. daily.

The first refinery manager of The Texas Company was a young man named R. C. Holmes, who had come down to Texas from Olean,

New York. The oil world was to hear much more of Mr. Holmes in following years, not only as a refining expert, but as a great leader and corporation executive.

With a refinery and a shipping station it was essential to provide the company with a marine department. In the beginning this consisted of a single barge 130 feet long with a crew of two besides a man on shore to help handle loading and discharging operations. Later on the company became the owner of a general utility boat rejoicing in the name of The Texas Girl. This was a combination business and pleasure craft, the vehicle of occasional picnic excursions and it is still in service, the veteran of a fleet of 152 marine units.

An Efficient Refiner

While The Texas Company from the beginning of its ambitious career has developed as a fully integrated organization, producing, refining, transporting and selling crude oil and its products, its conspicuous successes have been won in the two fields of refining and marketing. As a refiner the company early reached a position of leadership which ever since has been maintained. The record of its refining growth is shown by figures, representing crudes run at successive periods in its history.

RUNS TO STILLS							Crudes run bbl.
Year							
1905	...	...	...	...	...	...	548,136
1910	...	...	...	...	...	...	8,564,644
1915	...	...	...	...	...	...	17,874,880
1920	...	...	...	...	...	...	31,418,286
1925	...	...	...	...	...	...	34,414,290
1930	...	...	...	...	...	...	57,434,845

In the earlier years of The Texas Company kerosene was the principal refinery product with gasoline holding a minor place but these positions were soon reversed by the rapid spread of motor-cars, particularly in the United States. Even in these early days



A great Petroleum Refinery in Texas

the Port Arthur refinery established a high reputation for efficiency, partly by reason of its excellent equipment but largely because it was manned by an exceedingly able and well-trained staff under the direction of R. C. Holmes who was manager of the refining department from the beginning of The Texas Company until 1923. As the demand for gasoline increased and the elemental method of simple distillation gave place to improved methods of recovery the position of leadership enjoyed by The Texas Company's refineries was increased by the development and the adoption of the Holmes-Manley cracking process.

This process was developed commercially by R. C. Holmes and F. T. Manley. The latter was for many years assistant manager and later manager of the refining department and is now vice-president in charge of all refining operations.

In the operation of the Holmes-Manley process, a gas oil is preferably used as charge stock for the apparatus, although other heavy fractions of crude oil can be used satisfactorily. This gas oil charge stock first passes through heat exchangers in which it serves to help cool the products made in the process and in addition takes up heat which otherwise would be wasted. It is then pumped, together with recycled oils, whose origin is traced, through the tubes of a DeFlorez Upshot Heater, which is a cylindrical vertical furnace fired with gas burners at the bottom. Around the inside circumference of the cylinder vertical tubes are arranged for the passage of the oil. Heated to 900 deg. to 925 deg. F., and at a pressure of 400 lbs., the oil, which probably is really a very dense vapor, passes to well insulated vertical reaction chambers. There are two, sometimes more, of these vessels suitably interconnected. These vessels are made by a special process of electrically welding plates of boiler steel three inches or more in thickness. A single vessel may be five to seven feet in diameter and over 40 feet long. These reaction chambers provide a space where the hot vapor can soak in its own heat and where, as the name implies, the reactions which occur at this temperature and pressure have time to take place. In these chambers, the material undergoing reaction separates into two parts. What may be called the first part is the vapor which



Pacific Coast Refinery of the Company at Los Angeles

leaves the top of the last reaction chamber and is conducted to the bottom of the bubble tower. This tower is as strongly constructed as the stills, which it closely resembles, because the pressure in the Holmes-Manley cracking process is the same throughout the reacting and condensing system. The bubble tower is fitted with plates and in accord with the principles of fractionation serves to separate from the incoming vapor the partially converted charge stock which is returned to the heater as recycle. The tower allows the fractionated gasoline vapor to pass through it to the condensers. From the condensers the liquid gasoline flows through the control room, where the pressure is released, and out to storage.

The second part of the separation in the reaction chambers is the liquid which is drawn from the bottom of these chambers



Port Arthur Plant of the Texas Corporation

as rapidly as formed. This liquid consists of a mixture of gasoline, partially converted charge stock and fuel oil, an interconnected expansion chamber and bubble tower. It is released into the expansion part of the vessel at a reduced pressure somewhat above atmospheric. The fuel oil is dropped out, cooled and pumped to storage. The vapor containing the partially converted charge stock and the gasoline goes into the bubble tower where the partially converted charge stock is separated and returned to the heater as recycle. The gasoline vapor passes to the condenser and through the control room to storage. It is similar to the gasoline from the first bubble tower separation and is combined with it.

One unit of this process will charge 2,000 bbl. of virgin gas oil charging stock in a 24 hour day, and will produce 1,400 bbl. of unfinished gasoline, a conversion of 70 per cent. The unit remains in operation for long periods of time before the accumulation of coke in certain parts of the equipment makes cleaning necessary. The unfinished gasoline produced requires various additional treatments dependent upon the source of the charge stock.

The Texas Company operates 79 Holmes-Manley units. Others operate under license 48 units, a total of 127 units. The M. W. Kellogg Company, New York, arranges for licenses to prospective users.

The Texas Company appreciated at an early date the future importance of the cracking art. It was consequently enabled to obtain a strong patent position through well directed research work and through purchase. Not only is it the originator of the Holmes-Manley cracking process, but it is also privileged to use the Cross process, another outstanding cracking process, which differs from the Holmes-Manley in that the vapor is not separated in the reaction chamber but the entire charge is expanded together after the reaction is complete.

Among the newer processes The Texas Company has the privilege of using the DeFlorez Vapor Phase process. This process is peculiarly adapted to the production of exceptionally high anti-knock gasoline. It operates upon the clean circulation principle, which means that only clean distilled oil is circulated through the



Typical Diesel Pumping Station of The Texas Pipe Line Company showing Geared Pumps

heater, acting as a heat carrier to other stocks to be cracked. In this way, practically any class of stock can be heated to the necessary temperature for the production of high anti-knock gasoline without undue expense for repairs.



Manufacturing Texaco Signs in China

The commercial value of the Holmes-Manley cracking process is best indicated by the fact that it enabled The Texas Company in 1930 to obtain an average of 20½ gallons of gasoline from every 42 gallon bbl. of crude run. This recovery of 49 per cent compares with 25 per cent before the introduction of cracking and with an average of 42 per cent for the whole refining industry. While controlled by The Texas Company the process has been leased to many other refiners on a royalty basis.

As The Texas Company extended its operations to producing fields outside the South Texas territory and as the scope of its marketing activities broadened, the company established refineries at strategic points. The list of its present refining plants is as follows ;

THE TEXAS COMPANY'S REFINERIES

Refinery	Date of Establishment or Acquisition	Daily Crude Capacity (bbl.)
Port Arthus, Texas ...	Nov. 3, 1903	60,000
Port Neches, Texas ...	Sept. 1, 1906	20,000
Houston, Texas ...	Nov. 28, 1928	20,000
Wets Dallas, Texas ...	Jan. 1, 1908	16,000
San Antonio, Texas ...	July 27, 1929	3,000
El Paso, Texas ...	July 30, 1929	1,500
Amarillo, Texas ...	Nov. 1, 1928	3,000
West Tulsa, Okla. ...	Sept. 1, 1910	14,000
Lockport, Illinois ...	Dec. 31, 1911	20,000
Pryse, Kentucky ...	Sept. 1, 1926	2,000
Craig, Colorado ...	Oct. 13, 1926	1,000
Casper, Wyoming ...	Feb. 6, 1923	7,000
Cody, Wyoming ...	May 22, 1929	3,000
Sunburst, Mont. ...	Mar. 2, 1928	4,500
Los Angeles, Calif. ...	Mar. 2, 1928	30,000
Filmore, California ...	Mar. 2, 1928	4,000
Total ...	...	209,000



Texaco Bulk Distributing Station in Hongkong

Topping Plants

Shreveport, La...	...	Nov. 8, 1920	6,500
LaBarge, Wyoming	...	Mar. 2, 1928	300
Coalinga, Calif....	...	Mar. 2, 1928	500

Total ... 7,300

Asphalt Plants

Norfolk, Virginia	...	May 7, 1916	1,500
Marcus Hook, Pa.	...	July 13, 1916	1,500
Providence, R. I.	...	Apr. 18, 1917	1,500

Total ... 4,500

Total daily capacity ... 220,800

While gasoline may be termed the major product of manufacture The Texas Company produces altogether no less than 400 separate products including illuminating, and burning oils, motor oils, lubricating oils of many varieties and viscosities, greases, waxes, gas and fuel oils, asphalts, roofing and petroleum coke.

One of the specialized activities to which The Texas Company has given much attention is the production of asphalts to which the Port Neches plant, located on the Neches River, about eight miles north of Port Arthur, is primarily devoted.

Production

Although The Texas Company regularly refines somewhat more than the output of its own wells, purchasing from outside interests about 40 per cent of its crude supplies, the company ranks fifth among the producing companies of the United States. It holds in fee or under lease more than 6,500,000 acres of land and operates over 6,800 wells. Its peak production of 50,675,363 bbl. was attained in 1929. In 1930 its output was cut down to 42,287,291 bbl. in furtherance of the conservation program of which the company has been an active and consistent supporter.

Texas is still the company's chief source of crude, contributing nearly 40 per cent of the total supply. Beginning as we have seen, with the Spindletop, Sour Lake and Humble fields The Texas Company has extended its operations to other parts of the state as successive producing territories have been opened in Central Texas, West Texas and the Panhandle district and more recently in East Texas. Its first excursion beyond the Texas border was its entry into Oklahoma which ranks third among the states as a source of its crude supply. It has participated also in the development of the Louisiana, Kansas and Arkansas fields. Further away from the scene of its first activities the company operates wells in Kentucky, New Mexico, Colorado, Wyoming and Montana. By its acquisition of the California Petroleum Corporation in 1928 it became an important factor in Pacific Coast production with substantial holdings in the Santa Fe Springs, Signal Hill, Midway Sunset, and South Mountain fields.

Outside the United States the only territory in which The Texas Company has developed production is in Mexico where its crude output in 1930 was 253,414 bbl. Through subsidiaries it controls by ownership, lease or purchase options on 1,000,000 acres in foreign countries mainly in Colombia and Venezuela. In addition California Petroleum Corporation of Venezuela, in which Texas owns a half interest, holds 679,568 acres in Venezuela in concessions for exploration and development.

The accompanying table shows the distribution of the company's wells and the volume of its crude production from each of its various territories in 1930.

THE TEXAS COMPANY'S PRODUCTION

Territory	No. of Active Wells	Production (bbl.)
Texas...	2,154	16,871,096
Louisiana	375	2,715,172
Arkansas	216	1,246,499
Oklahoma	1,801	5,301,041
Kansas	998	1,278,982
Kentucky	551	237,075
New Mexico	20	1,336,137
Colorado	34	659,971
Wyoming	95	773,093

Montana	...	48	177,641
California	...	501	11,437,170
Total U.S.	...	6,793	42,033,877
Mexico	...	24	253,414
Total	...	6,817	42,287,291

In the distribution of products from its refineries The Texas Company employs water transportation so far as possible. In conformity with this plan it has established a series of 17 tidewater terminals that dot the coast of the United States at convenient intervals from Portland, Maine, to Seattle, Washington. To serve these terminals, as well as its many foreign stations, the company maintains a fleet of 24 steamships and six motorships with a gross tonnage of 167,950 tons. The full marine equipment of the company, including tugs, lighters and barges numbers 152 units. In 1930 its fleet covered runs of 1,577,313 nautical miles and conveyed cargo totalling 4,501,906 long tons.

For distribution inland from its terminals and refineries the company operates 7,600 tank cars, owned and leased. The distance covered by the company's cars in 1930 was 93,595,263 miles.

For nearly a quarter century from the time when its business career began The Texas Company continued its legal entity as a Texas corporation. In those years it had grown from a local concern devoted entirely to intrastate business to an international organization with ramifications extending to many lands. Its progress was hampered by the limitations of Texas law in regard to holdings in other corporations. In 1926, therefore, there was incorporated under the laws of Delaware, The Texas Corporation, a holding company with an authorized capitalization of \$250,000,000—since increased to \$350,000,000—in shares of \$25 each.

Following the organization of The Texas Corporation that company acquired all the property and assets of The Texas Company of Texas which were in turn conveyed to a new The Texas Company, incorporated in Delaware in 1927, which is now the active operating company except on the Pacific Coast where the business is carried on by The Texas Company (California) which is the principal subsidiary of the California Petroleum Corporation (Virginia) which in turn is over 99 per cent owned by The Texas Corporation. The California Petroleum Corporation was acquired by The Texas Corporation in 1928 through the exchange of shares on the basis of one share of Texas stock for two shares of the California company. This purchase strengthened The Texas Corporation by giving it large supplies of crude oil, refineries and distribution facilities on the Pacific Coast and a convenient base of operations for its Pacific and Far Eastern trade.

The companies owned by The Texas Corporation and through which its multifarious activities are carried on are incorporated in 10 states and 16 foreign countries or dependencies. The list is shown in the accompanying tabulation.

THE TEXAS CORPORATION'S SUBSIDIARIES

Name	Where Incorporated
The Texas Company	Delaware
California Petroleum Corporation...	Utah
Ventura-Colorado Oil Company	Maine
Texas Production Company	Colorado
The Texas Company of Mexico S. A.	Mexico
Texaco Sociedad Anonima...	Mexico
Texas Petroleum Company	New Jersey
The Texas Company of Canada, Ltd.	Canada
The Texas Oil Company, Limited	England
The Texas Co. (of Ireland) Ltd.	Ir. Free State
The Texas Company, S. A. F.	France
Societe Anonyme des Huiles Galena	France
The Texas Company, S. A. B.	Belgium
N. V. The Texas Company	Holland
The Texas Company, A. B.	Sweden
The Texas Co. (Overseas) Ltd.	Delaware
The Texas Company, A. S.	Denmark
The Texas Company, S. A. I....	Italy
The Texas Co. (S. Afr.) Ltd.	Union of S. Afr.
The Texas Company (India) Ltd....	Delaware
The Texas Co. (Australasia) Ltd.	New S. Wales
The Texas Company (China) Ltd.	Delaware
The Texas Co. (Philippine Is.) Inc.	Phil. Is.

Name	Where Incorporated
Galena-Signal Oil Co., Soc. Ano. ...	... Argentina
Soc. Ano. de Oleo Galena-Signal ...	... Brazil
The Texas Co. (S. America) Ltd. ...	... West Va.
The Texas Co. (West Indies) Ltd. ...	... Cuba
The Texas Co. (Caribbean) Ltd. ...	... Delaware
The Texas Co. (Porto Rico) Inc. ...	... Porto Rico
The Texas Pipe Line Company ...	... Texas
The Texas Pipe Line Co. of Okla. ...	... Oklahoma
*International Refining Company ...	... Montana
Mineral Investing Corporation ...	... Delaware
California Petroleum Corporation ...	... Virginia
The Texas Company ...	... California

* 56 per cent owned.

In addition to the above companies which are owned outright by The Texas Corporation except as noted it has a 50 per cent interest in the California Petroleum Corporation of Venezuela, owns half the stock of The Texas-Empire Pipe Line Company and 49 per cent of the Coltexo Corporation of Maryland.

The financial history of The Texas Corporation is simple but impressive. As previously related the Texas Fuel Company started business with a capital of \$50,000 which was increased to \$3,000,000 when The Texas Company was organized in 1902. Of this amount 4,000 shares of \$100 par value each were issued for cash and the remainder were exchanged for property in 1902 and 1903. In 1905 the share capital was increased by issuance of \$3,000,000 of stock sold for cash while in 1906 and again in 1907 additional shares amounting to \$2,000,000 in each case were sold. In 1908 and 1909 additions of \$1,000,000 each were made. Subsequent sales were \$6,000,000 in 1910; \$14,400,000 in 1916; \$11,100,000 in 1917; \$13,875,000 in 1918; \$15,625,000 in 1919; \$45,000,000 in 1920; \$21,450,000 in 1921; \$150,000 in 1926; \$5,000,000 in 1928 and \$35,104,675 in 1929. In 1913 shares of a par value of \$3,000,000 were issued in exchange for property and in 1928-1930 an aggregate of \$25,693,025 was issued in the same way, representing mainly the acquisition of California Petroleum. From the time of its organization to the end of 1930 the par value of stock sold for cash in The Texas Company was \$176,580,926 while \$31,293,025 par value was issued in acquiring property and \$38,404,825 in stock dividends; a total par value of stock issued to the end of 1930 of \$246,278,775. Much of the stock sold represented additional purchases by the early stockholders as much of it was obtained through the exercise of subscription rights. In 1929 the corporation issued \$100,000,000 of 5 per cent 15-year convertible debentures to provide for the expansion program then undertaken and which involved in 1929 and 1930 investment expenditures of 133,500,000. At the same time the authorized share capital was increased from \$250,000,000 to \$350,000,000 or from 10,000,000 to 14,000,000 shares in order to provide for the conversion feature of the bonds and to have treasury stock available for future requirements.

For 28 years The Texas Company has maintained an unbroken dividend record. Its first disbursement to shareholders was one of 10 per cent in April 1903, one year after the organization of the company.

Aircraft Construction in the Chinese Navy

(Continued on page 685)

engineers in the newly instituted class of aeronautical engineering in the College of Naval Construction. All the engine work at the N.A.E. was under his charge and in the course of the last eleven years he has carried out a great deal of experimental and research work on aero engines and prepared the designs of more than one engine; but unfortunately owing to the extremely restricted financial conditions of the Navy, the large amount of money necessary for the installations of plant and machinery for the manufacture of aero engines was never appropriated and no engines were therefore produced. When the N.A.E. was re-organized in the autumn of 1928 he was appointed Assistant Director with the rank of Captain.

In February, 1931, the Naval Air Establishment moved its headquarters to Lungwha, Shanghai. Upon Captain Wong Tsou's

resignation, Captain Tseng was appointed to the post of Director-General of the Naval Air Establishment. Captain Tseng is a member of the Science Society of China and the Chinese Society of Naval Engineers.

Barr Yu-Tsao, M.Sc.

Y. T. Barr was born in Chinkiang, Kiangsu in 1891. His early education was obtained in the Naval College at Nanking, whence he was sent to England to study engineering by the Ministry of Navy in 1909. During the first few years in England he was a premium apprentice in Messrs. Vickers Naval Construction Works in Barrow-in-Furness. In 1914 he graduated from Armstrong College, Durham University in mechanical engineering with the degree of B.Sc. He then returned to Vickers for work in their designing office where he specialized on steam turbines.

In 1915 he was ordered by the Chinese Ministry of Navy to America for aeronautical training. On arriving there he immediately took up flying training in Curtiss Flying School at Buffalo, New York, and upon completing the course he entered Massachusetts Institute of Technology and passed the post-graduate course of Aeronautical engineering with the degree of M.Sc. in the summer of 1916. He was then engaged by the Curtiss Aeroplane and Motor Co. of Buffalo, New York as aeronautical engineer. Later on he went to Detroit and joined the General Aeroplane Co. as designer.

He returned to China at the end of 1917, and soon afterwards was sent, as chairman of a committee of four, to Foochow by the Ministry of Navy to organize the Naval Air Establishment and at the same time to institute and instruct a course of aeronautical engineering in the College of Naval Construction. Besides executive and other duties, he was, together with Captain T. Wong, responsible for all the aircraft designed and constructed by the N.A.E. at Foochow.

In August, 1928, he was appointed representative of the Chinese Government to the International Aeronautical Exhibition in Berlin. After its close he visited for six months all the important government and civil aeronautical institutions and factories in Germany, France, Belgium and England, and thus was afforded a unique opportunity to study European aeronautical conditions. Shortly after he went to Europe the N.A.E. was reorganized and he was appointed Director with the rank of captain. Captain Barr is a member of the Science Society of China, the Chinese Society of Naval Engineers and the Society of Automotive Engineers, New York.

Machinery Market in China

(Continued from page 673)

It is indicative of the huge potentialities of this trade that in 1917 only 90 power plants were in operation throughout the Republic, whereas at the beginning of 1930 no less than 724 were functioning. At present, nearly all of these work on fuel, but water power resources approach no less than 1,000,000 h.p., 99 per cent of which is still unexploited. Though a change in the type of machinery required will not come at once, it is worth recording that the National Government is to issue a ruling in respect of the utilization of water power resources. At the moment official efforts to assist this branch of industry are having rather the opposite effect, but the intention is good, and when regulations have been rendered less conflicting it is probable that developments will proceed along more satisfactory lines. Japan, with roughly 33 per cent of total imports, is at present the leading supplier of electrical goods to China—Great Britain and the U.S.A. follow with 17 and 16 per cent respectively—but the nature of its products is such that they should not seriously inconvenience British supplies. As previously stated, it is inadequate service which principally militates against British participation in the heavy machinery trade. Solve this problem, and for all the adverse effects of restricted buying power, falling exchange and price discrepancy, sales of British equipment, with its enviable reputation for consistency and durability, will soon again be on the up-grade.

Motor Rail Cars in China

Trade Commissioner,
A. VIOLA SMITH,
Shanghai

 MOTOR rail cars have been used to a very negligible extent in China. In Kwangtung Province the Sunning Railway has used several rail cars, and in Manchuria they are in use by both Chinese and Japanese railway lines. In central China this type of equipment is found in both the Shanghai and Hangchow areas.

Equipment of the Shanghai-Chuansha Line

The Shanghai-Chuansha Railway, known as the Shanghai-Chuansha Transport Co., was started by private enterprise in October, 1925, with a capital of \$300,000 Mexican. (One Chinese Mexican dollar is equivalent to approximately \$0.2197.) It operates over a 21-kilometer (13-mile) stretch through a rural district in the environs of Shanghai; its Shanghai terminus is Chingningsz, a small village on the Pootung (east) side of the Whangpoo River, some six miles distant from Shanghai proper. In former days it was difficult to reach, as no regular ferry service was maintained and passengers were obliged to rely on native sampans for transport from the terminus to the Shanghai side. With the recent inauguration of a modern ferry service, this line has become readily accessible.

The Bureau of Public Utilities of the municipality of Greater Shanghai has developed a splendid ferry service on the Whangpoo River, placing in service four new ferries at a cost of \$400,000 Mexican. Each boat can accommodate 40 first class, 160 second class, and 300 third class passengers. From Shanghai to Kaochao, 12 round trips are made daily, with intermediate stops at Szetoo, Chingningsz, and Tungkow. Through tickets are now readily purchasable at the Nanking Road Jetty to Chuansha, thus greatly facilitating the journey over this light railway from Chingningsz to Chuansha.

The Shanghai-Chuansha Transport Co. is reported to have 19 cars and four engines. The latter consist of two semi-Diesel engines, one gasoline engine, and one American tractor engine.

The company states that between four and five gallons of gasoline are consumed per engine per trip. The engines burning a semi-Diesel oil usually take four gallons per trip at a cost of \$1.50 Mexican per gallon. Each engine pulls two cars at a time, each car accommodating from 24 to 32 passengers. Passenger cars owned by this company have a total seating capacity of 396



DEPARTURE IN RAILWAY TRANSPORT IN CHINA

On Feeder Lines to the Sunning Railway in South China, Engineers have constructed Bodies on Dodge Chassis. These have been in operation since August and are working very satisfactorily

persons. First and second class accommodations are available, and about 680,000 passengers are carried annually. The width of the gage is one meter. Steel rails are laid on wooden ties with stone ballast between them.

Shanghai-Nanhwei Line

The Shanghai-Nanhwei line, to the south of Shanghai, is also located on the Pootung side of the Whangpoo River. The company owns and operates a steam tug with lighters, as a ferry service between the Shanghai side of the river and Tungkiadoo, the Pootung terminus of the line. The railway is about eight miles in length, extending from Tungkiadoo to Chowpu. The company is now planning to extend the line from Chowpu to Sinchang, some 21 1/2 (8 1/2 miles) from Chowpu.

Two coal-burning steam locomotives of German manufacture serve this line from Tungkiadoo to Chowpu, and six passenger trains, with a total seating capacity of 320, complete the equipment. Passengers carried annually are reported to be about 600,000. The company owns four gasoline motor rail cars, one of which is now used on the short spur road from the opposite bank of a creek at Chowpu for a distance of about two-thirds of a mile to connect with a steamer for Nanhwei.

Both the Shanghai-Chuansha and the Shanghai-Nanhwei Railways are under the jurisdiction of the Bureau of Public Utilities of the municipality of Greater Shanghai (Chinese), to whom they are required to submit periodic reports. Copies of such reports must also be filed with the bureau of reconstruction of the district government in their respective localities. Originally each of these lines started as motor-bus companies—the Shanghai-Chuansha line with six busses and the Shanghai-Nanhwei line with four—but, owing to the heavy maintenance costs of the roadbeds, these companies decided to convert the roads into light railways. In 1926 the companies are reported to have been reorganized, and the introduction of light railways instead of motor-bus transportation was begun.

At the present time each of these companies seems to be strongly in favor



Ruhrthaler Engine: Shanghai-Chuansha Railway



Motor Rail Cars on Shanghai-Chuansha Railway

of German equipment. However, if American manufacturers could effectively demonstrate to them the economic operation of motor rail cars they might be disposed to give American equipment a trial when future purchases are being considered.

Hangchow-Kiangshan Line

A light railway is now in course of construction from Hangchow to Kiangshan in Chekiang Province. Recently one motor rail car, built locally in Shanghai, was delivered to this line for use in its construction work.

The Hangchow-Kiangshan Railway has been projected to run from Hangchow, through the cities of Siao-shan, Chuki, Iwu, Kihwa, Lanchi, Lungyou, Chühsien and Kiangshan, to Yushan, the latter being a few miles over the border in Kiangsi Province. Surveys have been completed for this entire route.

No actual construction work of any portion has been started until the financial provisions necessary for its construction and equipment have been fully completed. As a result of this careful planning of all parts of the project, the first 65 kilometers (41 miles) to Chuki were placed in operation on June first this year. Orders for track materials and rolling stock were placed with foreign mills many months ago and the first deliveries of this material for completing the line from Chuki to Lanchi (a further 133 kilometers) are expected to arrive in Shanghai in the current month. Track-laying for this extension will start as soon as deliveries can be made to the present terminus at Chuki and will be pushed as fast as weather conditions will permit. The working schedule, which was prepared nearly a year ago (and which has proven so far to have

been practically correct), provides for tracklaying to start at Chuki about the first of October and for trains to be in operation into "the famous ham country" late in the coming winter. The total line from Hangchow to Lanchi is 198 kilometers (123 miles) long.

The section of roadway to which your correspondent refers as causing concern is one of those minor occurrences common to most new railways. The track is being maintained (though in safety) rather close to the river bank, pending the further tedious cutting back of a rocky promontory. When completed, this section will be as free from danger from the river as any other section though its proximity to river and mountains adds to the scenic beauties of the line.

Sunning Railway

In South China the Sunning Railway has utilized motor rail cars with considerable success. The total length of the Sunning Railway in Kwangtung Province is 96 miles. In 1930 two 3-ton American motor rail cars with trailers were supplied to this railway. The rail cars with trailer have been successfully operated on the 22-mile stretch from Toishan to Pakshan and on the 20-mile route from Toishan to Kungyick.

In an article appearing in the motor section of the *North-China Daily News* last year, it was stated that this rail car made four return trips each day, carrying an average of 1,000 passengers per day. The gasoline consumption on this car was given as 7.4 miles per American gallon. As the Sunning Railway is using a Y-shaped track instead of a turntable to turn the cars around, and as they do not have a reversing transmission, the article indicated that a



Chingningsz Station, Pootung: Shanghai-Chuansha Railway

good deal of gasoline was being wasted in switching the cars around. The consumption given above includes this waste of gasoline, and the correct consumption should be about eight miles per gallon.

One rail car with trailer operates over the 20-mile route from Toishan and Kungyick, carrying an average of 400 passengers per day. The gasoline consumption is about the same as that on the Toishan-Pakshan route.

In a recent report from Assistant Trade Commissioner Maynard regarding the operation of these motor rail cars by the Sunning Railway, it was stated that the railway had encountered some objections to the operation of these trucks from Canton officials, who felt that this type of transportation might retard the development of highways.

Motor Rail Cars in Manchuria

Motor rail cars for transporting passengers over short routes are in use by the South Manchuria Railway Co., according to Trade Commissioner J. J. Ehrhardt. A total of 17 cars, 12 of which are of 105-passenger and five of which are 50-passenger capacity, were purchased late in 1930. This equipment is of Japanese manufacture. They are equipped, however, with American motors and clutches, and other important parts also were purchased from the United States. Mr. Ehrhardt states that the railway company has found these cars very economical and is using them mainly for transporting school children. It is also indicated that 13 additional engines and parts for motor cars have been purchased. Construction of these cars will be done by the Shakako works of the South Manchuria Railway Co. at Dairen.

The small Buddha car is the standard specification of the Chinese railways in Manchuria—the L type, which carries six or eight passengers, according to Trade Commissioner Ehrhardt. Motor rail cars are used for the transportation of railway employees and railway police in time of emergencies.

Fragmentary information has been received to the effect that light American model cars, mounted on rails, have been utilized by the Chinese Eastern Railway for the transportation of railway employees.



Gasoline Motor-car, Capacity 80 Persons for Ko-Jaku Railway, Manufactured by Kawasaki Sharyo Kaisha, Kobe

and infrequent trains or small trains meet all the requirements. Since these carriages equipped with internal combustion engines have proved themselves satisfactory, many railway concerns have placed orders for vehicles of this type in place of electrically driven or steam engined cars, and even the state

railroad department has given a favorable consideration in this respect and now ten of these trains are under construction for trial in its car shop near Tokyo. When these cars are completed they are expected to be placed on the suburban and other minor traffic lines in Japan.

In this connection, the authorities are drawing attention of the private railway companies which are now operating their service with steam locomotive in comparatively short distance and of those who have been granted permission to inaugurate electric railway service in the country district, and are pointing out that the construction of steam or electrically operated traffic will lock up a considerable amount of capital and that the auto train proposition is more economical in many respects.



Interior of one of the New Guy Trolley-buses for Kyoto

Used in Many Lines

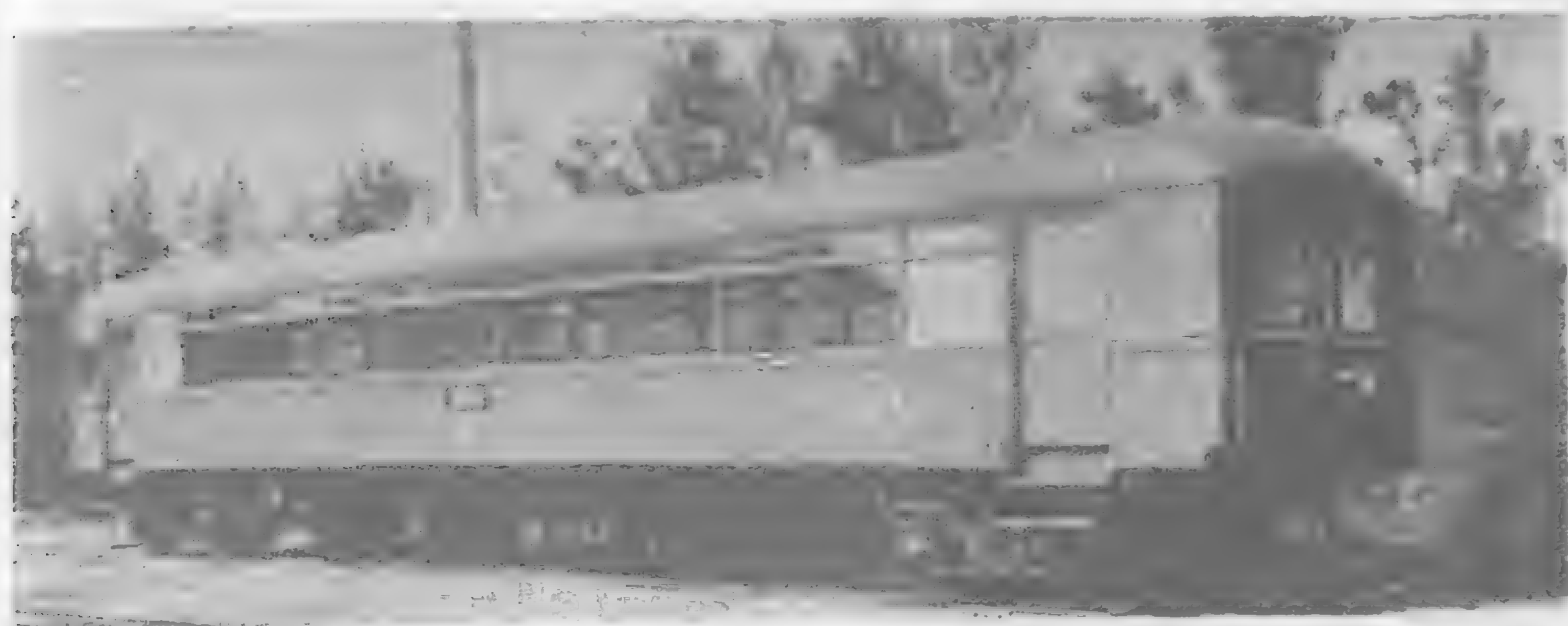
According to the latest report of the Railway Inspection Bureau, the railroad service lines that are running these auto trains are as follows:

Ikasa Railway, Tomoe Railway, Mihata Railway, Shimotsui Railway, Mie Railway, Yokkaichi Railway, Yokohagi Railway, Osaka Electric Railway, Sangu Express, Bantan Railway, Kurate Railway, Enshu Electric Railway, Nakase Railway, Seien Electric Railway, and Kita Ena Railway line.

The typical features of those motor trains now used are:



One of Kyoto's new Trolley-bus Fleet, Accommodation 70 Passengers, 35 Sitting and 35 Standing



Gasoline Motor Steel Car, Capacity 100 Persons for Chosen (Korea) Railways, Manufactured by Nippon Sharyo Kaisha, Nagoya

Train built by the Japan Car Building Company that cost about Y.4,500 with forward gears only and those with reverse cost about Y.8,500; cars weight without passenger, conductor or engine man is about three tons; passenger seating capacity averages 30; power plant Ford engine; speed maximum 22 miles per hour and 16 miles per hour economical run; total distance car can be run is about 35,000 miles; gasoline consumption is about 18 miles per imperial gallon; operation cost is about 70 per cent of steam train.

In comparison with electrical railway system which consists on the average at least Y.300,000 a mile in construction, this new motor system will be found so cheap in operation and construction that they can hardly be compared with, and this is more evident in case of short distance service, it is reported.

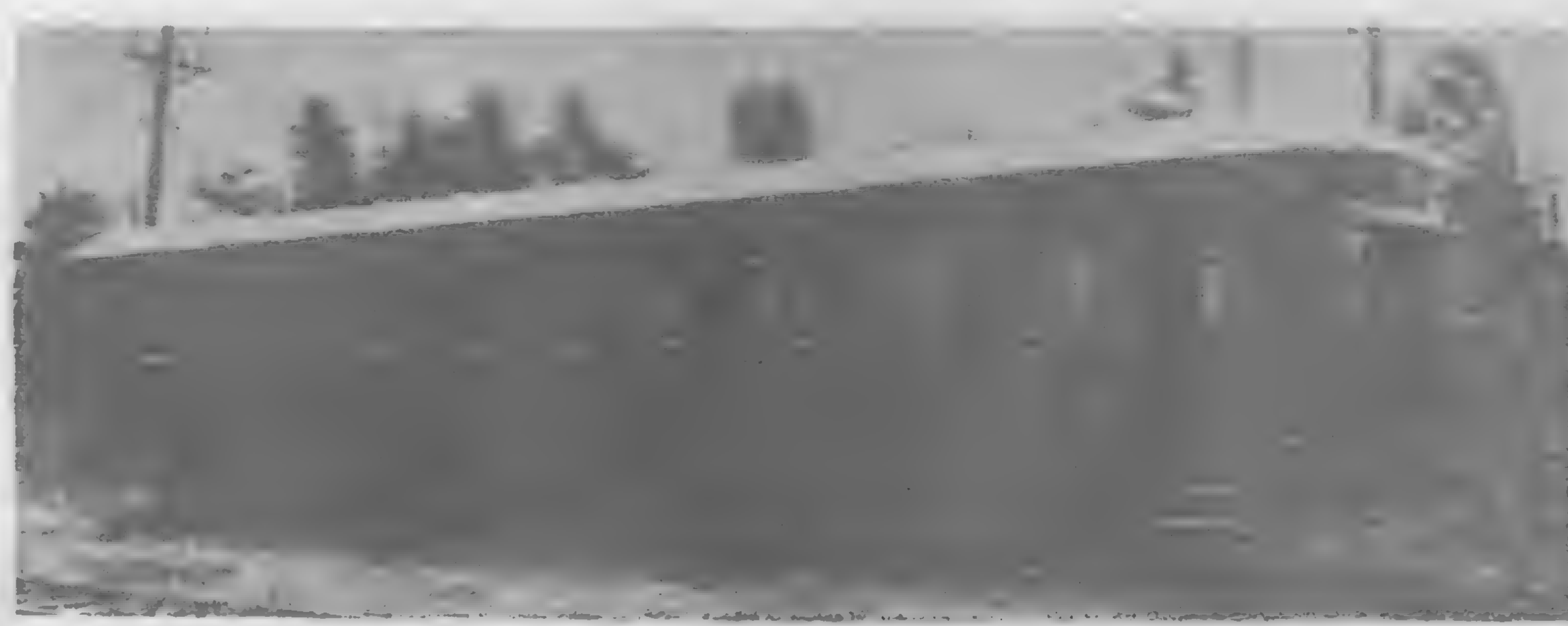
New Trolley Buses for Kyoto

In many districts in Japan street cars occupying the center of the busiest streets have been removed with the main object of speeding up city transport, but largely also because the cost of their replacement by a newer type of street car would have been prohibitive, and because a solution of the traffic problem lies in the incidence of the modern electric trolley bus.

Such was the state of affairs in Kyoto when the authorities commissioned their London representatives to make a study of the various types of trolley bus manufactured in the United Kingdom, and to recommend the adoption of the most suitable vehicle. As a result of their investigation, an initial fleet of Guy single-deck trolley buses has just been shipped to Japan from Wolverhampton.

The chassis of this model is the Guy four-wheeled single-decker, fitted with Westinghouse brakes operating directly on all wheels. The bodies have a seating capacity for 35 passengers, the seats being longitudinal, and standing room for 35 passengers as well. There are two entrances fitted with doors of the folding type on the near-side of the bus, both doors being fitted with a device enabling them to be operated from the driver's seat as well as by the conductor. The main body framing is of naturally seasoned English ash, the principal members being machined for lightness combined with strength. These members are enforced and tied together with special steel gussets and flitch plates. The cross bearers are of ash and strengthened by steel edge plates bolted to and continued up the pillars. The floor, is of $\frac{3}{4}$ -inch boards cemented between the joints, and the trap doors are provided to give easy access to chassis units. The floor is covered with a $\frac{1}{2}$ -inch layer of concrete. The roof is supported on ash sticks, steam-bent and fixed with sheet-steel, covered and lined with 4 mm. birch plywood, then covered with 13-oz. duck laid in thick white lead. The front and rear domes are of hand-beaten 18-gauge aluminium.

The whole of the exterior panels are of 16 S.W.G. aluminium, the joints being covered with molding screwed to pillars and bedded in white lead. The inside of the panels is treated with anti-corrosive paint. The interior panels are of three-ply birch, covered with leather cloth from waist rail to seat rail. A 4-in. kicking rail is fitted between seat rail and floor. The seats are arranged longitudinally along each side and at rear bulkhead. The cushions are made up on lattice-type spring cases, and the squabs are fitted with coil springs. The whole of the seat is padded with felt and horsehair and trimmed with moquette. There are four main windows on each side, to drop, fitted with Rawlings cam-type center-locking gear. Fixed windows are let into pillars with velvet rubber channel and fixed with real mahogany fillets screwed to pillars. Glass



Gasoline Motor Steel Car (Capacity 110 Persons) for the South Manchuria Railways, Manufactured by Nippon Sharyo Kaisha, Nagoya

louvres are fitted each side, permitting the windows to be dropped three inches even in rainy weather.

Railless Trams for Nanking

The vast and scattered city of Nanking may soon have the services of railless trams if plans submitted to the Municipal Government there by a wealthy Chinese oversea merchant group are approved.

The merchants recently submitted to the city government a plan to establish a railless tram service in the Chinese capital city under a franchise. As most of the thoroughfares in the city are paved with asphalt, the merchants declare that the service will be provided for better communication facilities for a big city.

City government circles are understood to be interested by the application. They, however, are worried at the traffic congestion now already experienced because of the enormous number of motor-cars. Nanking official circles are generally in favor of this service as they believe that the congestion could be eliminated with the completion of the other thoroughfares.

If the plan materializes, Nanking will be the second city in China which boasts a railless tram service. These types of vehicles were first introduced in Shanghai.

U.S.S.R. Metal Industry

The Tass Agency, quoted by *Reuter's Trade Service*, says that this year the sum of 1,123,000,000 roubles will be invested in the Soviet iron and steel industry, compared with 415,000,000 roubles in 1929-30.

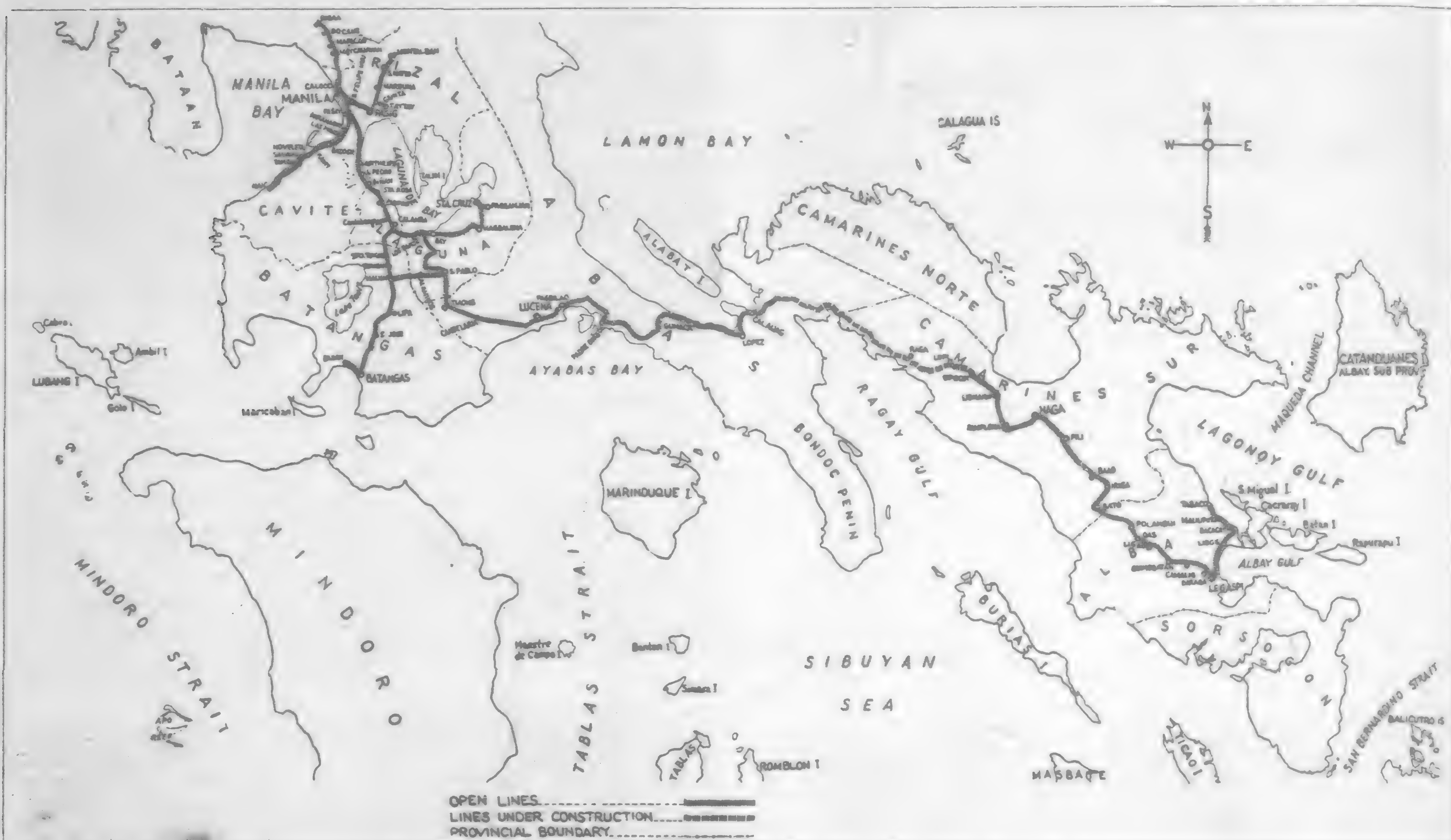
As a result of these investments a number of new blast furnaces and open hearth ovens have already been put into operation, including the blast furnace at the Mokeyev works (Donetz Basin), which has a capacity of 700 tons a day.

Many new metal factories are being built, including those of Magnitogorsk and Kuznetsk, which are to start operations this year; the Tula, Lipetzk, Novo-Tagil and various other plants under construction are to be completed during the following year or two. All these plants will have blast furnaces with a daily capacity of 700 to 1,000 tons of iron. The Magnitogorsk works when completed will produce 3,000,000 tons of iron and 2,400,000 tons of steel a year.

The aggregate capacity of the blast furnaces in the Soviet Union at the end of this year will be 9,000,000 tons a year, compared with 4,200,000 in 1913.

The metal industry is developing in entirely new regions that had not been exploited before the war, such as Khopier, Khalilovka, Sinar, Bashkiria; at the same time the Ural region, which before the war played an insignificant part, is now becoming the second largest metal region in the U.S.S.R.

A striking indication of the development of the Soviet metal industry is the production, for the first time in the history of the country, of high-quality metals used by the motor and tractor industry, which is itself an entirely new and rapidly developing industry in the Soviet Union. Already five factories have been adapted to the manufacture of special steel and a number of others are being reorganized with the same end in view. The manufacture of transformer and dynamo steel and other materials used by the electrical industry has also been organized.—(*Reuter.*)



Map of Manila Railway—Southern Lines

Railroad Building in the Philippines*

DOWN in the Bicol country, in the rugged province of Camarines Norte, a thrilling chapter is being written in the history of Philippine railroad building.

In nine months 22 kilometers of track have been laid, five steel bridges have been erected and nine other bridges are under way, by far the greatest amount of track and bridge construction ever done from a single railhead in the Philippines in a single year.

When English interests controlled the Manila Railroad company, about 50 kilometers of track were laid in one year, but this was done from four or five railheads (i.e., ends of track) and very little permanent bridging was done. Thus the track laid from each railhead amounted to only 10 or 12 kilometers in a single year.

This record in track laying and bridge building has been made on the Aloneros-Pamplona project that will connect Manila with Legaspi and will make a single stretch of track all the way from Legaspi, at the southern end of the island of Luzon, to San Fernando, La Union, far up in Northern Luzon.

For years the lack of track between Aloneros and Pamplona has necessitated taking a boat across Ragay gulf, a loss of time and a waste of money. But the rugged, hilly, province of Camarines Norte has stood in the way of pushing the project through to its completion.

*From *The Manila Free Press*.



Bridge Over Libmanan River, Near Libmanan, Camarines Sur. Bridge Consists of Six 150-foot Thru Spans and One 16-Meter Deck Span at North End



Sipocot Station, km. 345.3 Pamplona-Ragay Extension



Bigaan Bridge, km. 347, between Mantalisay and Sipocot, Pamplona-Ragay Extension

The total cost of laying the 110 kilometers of track from Pamplona to Aloneros was estimated at P.7,500,000. In order to secure this money and for other purposes the government was authorized to take up P.14,000,000 of the railroad company's bonds as the funds were available.

Since January, 1928, 51 kilometers of track has been laid—the section from Pamplona to Ragay—at a cost of P.3,000,000. Plans for next year call for pushing the track through from Ragay to Catabonga, where wharving facilities will cut the boat trip—

the heaviest construction the Manila railroad has carried through.

In one short section of 13 kilometers nine bridges had to be built. The same distance required 620,000 cubic meters of embankment and fill, and the inability to bring up heavy grading equipment, because there were no roads, meant that it had to be done by pick and shovel. Truly a colossal achievement!

Fortunately more modern methods could be used for the bridges. The high arch piers of the Manangle river bridge were built with a steel tower that acted as a scaffold, held the panel



Views showing Construction Work in Progress North of Sipcot, from kilometer 340.4 to kilometer 341.3, on the Pamplona-Ragay Extension, Camarines Sur

now from New Aloneros to Pasacao—from seven hours to two and a half hours. The completion of the total line, bringing the track from Catabonga up to Aloneros, is largely a matter of how soon funds will be available.

As the public rides in comfort over the new track it little realizes the tremendous difficulties encountered by the engineers and laborers. Much of the new construction was through wild, heavily forested country, inhabited by Negritos. The tracks had to cross a divide running from the waters of the Pacific to those of the China sea. In fact, the section completed in this record-breaking time was

forms and the hoist for the concrete pouring, and finally remained within the concrete pier as reinforcing steel.

In building the bridges steam cranes were used to place the steel superstructures. Modern, reinforced concrete bridges, column piers, cellular abutments, etc., were designed and constructed in place of the old style, expensive, mass concrete design used formerly. The structures have a grace of line as well the grace of being cheaper and better.

Many old English steel arch bridges, carried in stock in the Caloocan yards since 1908, were worked into the new structures.

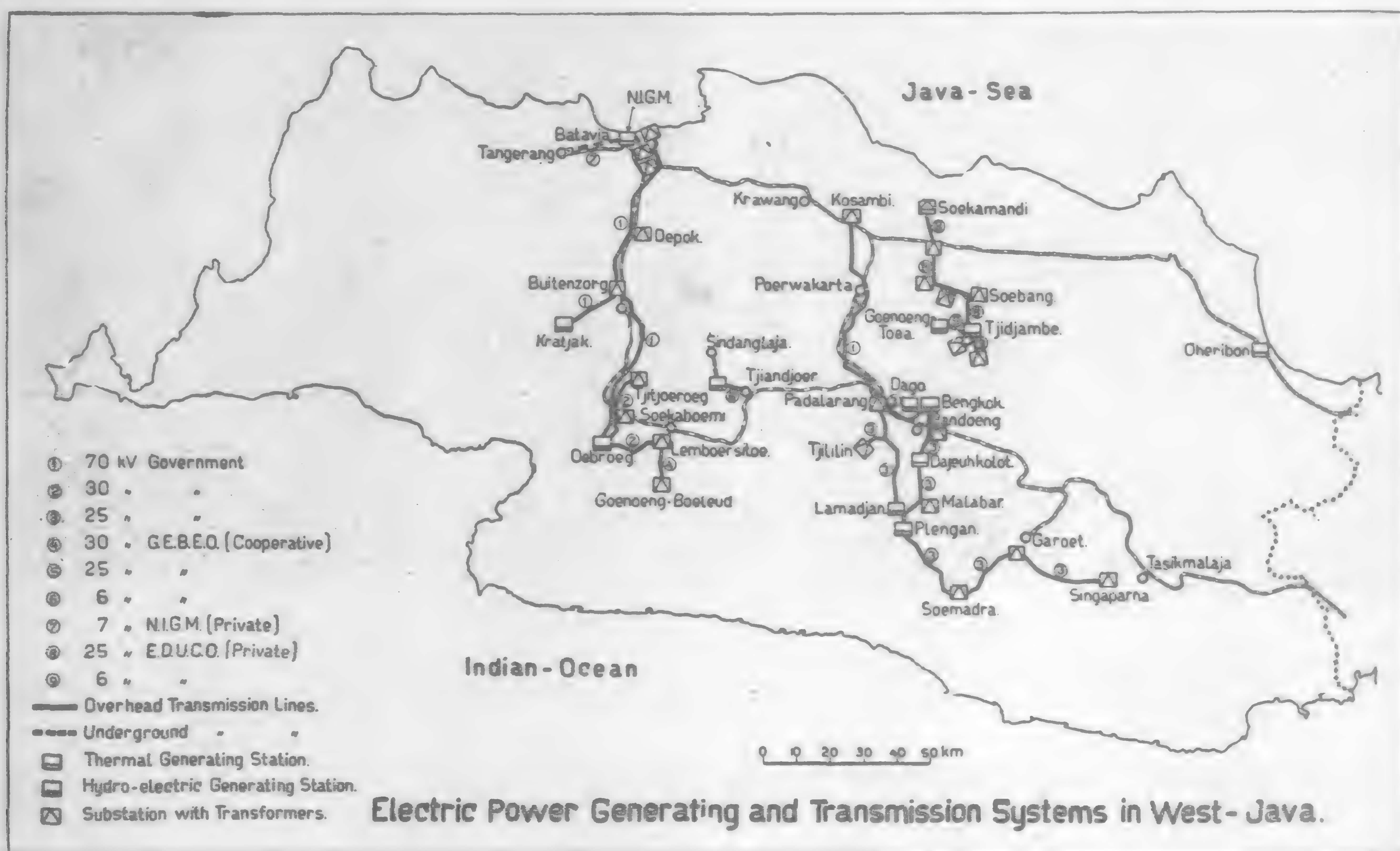
(Continued from page 703)



Cut and Fill, km. 320, Near Ragay, Pamplona-Ragay Extension



Completed Subgrade Through Forest on Section of Line between Ragay and Lupi, km. 326, Pamplona-Ragay Extension



Water-power and Electricity in the N.E.I.

ALTHOUGH about 6.6 million h.p. of potential water-power are available in the whole of the Netherlands East Indies, the distribution over the different islands does not by any means correspond to the requirements, at least in the near future, a fact which stands in the way of a profitable employment of many of these sources of energy. For example, Java, which is the most densely populated and the most highly developed of the islands, possesses only 600,000 h.p. or scarcely more than one-seventieth h.p. per head. How little that is, can be seen from the fact that some Western countries are employing more than one horse-power per head of population. The greater part of the water-power is to be found in West and Central-Java. In East-Java the topographic situation causes an unfavorable dividing up of the drainage areas of the mountain rivers, while a long dry monsoon is another unfavorable factor.

Of the other islands, Sumatra and Borneo each have about two million h.p., Celebes about one million, and the remainder about one million between them. All these great sources of power are lying practically unused at present. How far it will be possible to develop them in the future is a problem about the solution of which nothing positive can yet be said.

It is clear from the above that the Netherlands East Indies have to guard against any waste, especially as regards the sources of water-power in Java. With that object the Government has drawn into its own hands all the operations pertaining to the exploration, survey and development of water-power and has concentrated them in a special expert Division, namely that of

Water-power and Electricity, created in 1917. It is by no means a monopoly that is intended by this policy of the Government. While a certain number of suitable sources will be reserved for general lighting and power supply and for the electrification of railways, the remainder will be available for private development.

To the sphere of operations of the Division in question belongs, in the first place, the systematic prospecting for sources of water-power, both by the study of maps and by survey of land and gauging of water-courses.

For the latter purpose there are in Java 65, in Sumatra four and in Celebes 10 observation-stations set up in rivers and lakes; many of these are equipped with registering instruments. The results of the observations are published yearly.

All the information relating to the working of sources of power is systematically entered in a water-power cadaster, which is accessible to the public and from which information is furnished upon payment of a fee.

The Division also prepares estimates and drafts for Government Works in the electro-technical sphere and deals with water-power concessions and licences for the erection and use of electrical supply lines.

Water-power concessions (for a capacity exceeding 100 theoretical h.p.) are usually granted for 40 years under conditions allowing for appropriation by the Government and on payment of a small tax. For a smaller capacity a licence is granted until further notice and subject to very simple conditions.

Electrical licences for public utility purposes (electrical services) are granted for



Hydro-electric Power-station Lamadjan with Penstock



Generator-room in the Hydro-electric Power-station Oubroug with two 5,500 kw. unit

a fixed period not exceeding 40 years; licences for private purposes (such as industries and commercial enterprises) are terminable at notice.

There were valid at the end of 1928: 76 water-power concessions (42 in Java, 34 in Sumatra) and 370 licences for electrical installations (279 for private enterprises and 91 for public utility purposes).

With a view to the economic supply of electricity for the country's need and in order to harmonize the various interests, which are concerned in the employment of considerable sources of water-power, that can serve extensive areas, the development of such large sources for the generation of electrical energy will as a rule be retained in the hands of the Government, while the distribution of the power generated is entrusted to private or mixed companies that are competent thereto. In a few instances the local authorities undertake the distribution. As a consequence of this division of activities the construction and exploitation of water-power works with primary transmission-systems and substations has grown into an important subdivision of the work of the Division of Water-power and Electricity.

West-Java is the most developed as regards the working of sources of water-power for the general supply of electricity. The light and power works of Batavia and environs, as well as the electrified railways around Batavia, have since 1925, been fed by means of a 70,000 volts line from the Government power-station *Oubroug* on the Tjijatih river near Tjibadak; this station is equipped with two turbo-generator units of 5,400 kilowatts each. It also supplies Buitenzorg and Sukaboemi with electrical energy. Distribution and retail in Batavia are entrusted to the "*Ned.-Indische Gas Mij*" and in Buitenzorg and Sukaboemi to the "*Gebeo*," a mixed public electric utility company. A second power-station, *Kratjak*, on the Tjianten, with two by 5,500 kilowatts will be connected with this system in Buitenzorg.

For the supply of the plateau of Bandoung the Government disposes of the following water-power plants: *Bengkok* on the Tjikapundung with three aggregates of 1,050 kw.; *Plengan* on the Tjisaruwa with three aggregates of 1,050 kw.; and *Lamadjan*, on the Tjisangkoui with two aggregates of 6,400 kw. For the distribution of the power the "*Gebeo*" was formed, which concern started operations on January 1, 1920. Outside the scope of this distribution lies the radio-station Malabar, which for reasons of state is directly connected with the Government power-system.

The Government water-power works have been greatly extended since their institution and we may anticipate a continuous development in future years. At present the Division is engaged in constructing new transmission lines and substations, which are intended to open new areas, such as Garut, Tasikmalaya and the Krawang-district, for the electrical energy supplied by the Government systems.

The accompanying map shows what has been or is being done in the sphere of electric supply in West-Java by or with the assistance of the Department.

In Central-Java, on the river Tuntang, stands the water-power station *Sousoukan*, which belongs to the "*Algemeene Nederlandsch-*

Indische Electriciteit Maatschappij" (*Aniem*) and was put into operation in 1913 to supply Samarang and Salatiga. It comprises six generating units with a total of 4,000 kw.

The Government power-station of *Giringan* on the river Tjatour near Madioun is equipped with two aggregates of 740 kw. and commenced working in 1917. It was originally intended to supply energy only to the Government Railway Workshops at Madioun, but in 1921 the municipal electric services of that town were also connected.

In East-Java, with a view to supplying the provinces of Sourabaya, Kediri and Pasuruan, the power-station of *Mendalan* was recently opened on the river Konto; it is equipped with three units of 5,500 kw. each. Constructed according to the plans and estimates of the Water-power and Electricity Division, and for the most part by officials detailed by the Department, it is operated by the "*Nederlandsch-Indische Waterkracht Exploitatie Maatschappij*" (*Niwem*), which is a combine of the Government and the "*Aniem*."

The "*Aniem*" owns flourishing electrical works in this area (e.g. in the towns of Sourabaya and Malang) and sees to the distribution.

There are projects in preparation for the supply of power in Central-Java and in the eastern point of that island. When these become an accomplished fact, the main points of Java will have been marked out for an inter-connected system of hydro-electrical services.

The same degree of progress has naturally not yet been reached in the Outer Islands. Only one Government water-power station has been erected, namely the *Teis* power-station on the river Ketahun (Bencoolen), which is equipped with two aggregates of about 740 kw. This supplies electrical energy for the Government gold and silver mines at Tambang Sawah and the private mine Redjang Lebong.

Among private power-stations may be named: in Java, that of Malabar Tea Estate near Bandoung (2,250 kw.) and of the Pamanukan and Tjiasemlanden (800 and 1,200 kw.); and in the Outer Islands, that of the Indarung Cement Works near Padang (1,800 and 1,200 kw.) and of the *Handelsvereniging "Amsterdam"* in Deli (2,500 kw.).

The following table gives a summary of the distribution of the total amount of primary electrical power (in kilowatts) in 1928:

Power-works		Hydro-electrical	Caloric	Total
1. Public Services.	Java & Mad.	23,500	35,700	59,200
	Outer Islands	200	12,400	12,600
	Total	23,700	48,100	71,800
2. Government Stations				
	(a) to supply public services			
	Java & Mad.	32,600	1,700	34,300
	Outer Islands	—	2,000	2,000
(b) to supply Government works	Java & Mad.	400	1,400	1,800
	Outer Islands	1,600	26,100	27,700
	Total	34,600	31,200	65,800
3. Excl. to supply energy for private enterprises	Total	20,000	60,000	80,000
	Grand Total	78,300	139,300	217,600

(Continued on page 703)



Port Swettenham, F.M.S.

Port Swettenham Improvements

VERY interesting recommendations have been made by the Imperial Shipping Committee, the chairman of which is Sir Halford Mackinder, regarding the improvement of Port Swettenham, Federated Malay States. The estimated cost is £1,300,000 and the committee states that some small increase in port dues might be accepted if increased efficiency and quick despatch were provided.

The plan submitted to the committee is for the construction of deep water wharves at a new site on the North Klang Strait, some three miles from the existing port. The proposed site for the new wharves is easy of access to shipping, the current flows north and south, and the consulting engineers assure the committee that only very occasional dredging will be necessary. At times, a wind, known locally as the Sumatra, springs up for some two hours, but it is understood that this would occasion no risk to vessels lying alongside the wharves, although it would be unsafe for ships actually to berth while it was in progress. The committee is satisfied the site is suitable for deep water wharves; moreover, it has the added advantage of being capable of almost unlimited extension.

The plan provides for the construction of 3,000 feet of wharfage, 145-ft. wide, with a depth alongside of 33-ft. l.w.o.s.t. It is subdivided into three sections as follows:—

Scheme A provides for the construction of 1,000 feet of wharfage with temporary transit sheds and offices, and for the construction of a single rail connection between the new site and the existing port, including a bridge over the Kland River, at an estimated cost of \$12,000,000, or £1,400,000.

Scheme B provides for a further 1,000-ft. of wharfage, for doubling the railroad track, and providing a road for the new wharf to Port Swettenham, and for full facilities in the way of offices, sidings, warehouse accommodation, etc., in replacement of those at Port Swettenham, at an estimated cost of \$15,000,000.

Scheme C provides for an additional 1,000-ft. of wharfage and two transit sheds thereon, at an estimated cost of \$9,000,000. The total estimated cost of all three schemes is, therefore, \$36,000,000.

The committee recommends that Scheme A should be commenced forthwith, but with four modifications, namely, (a) that the length of wharfage provided should be increased say, to 1,100 or 1,200-ft. in order to provide two adequate berths for ocean-

going vessels; (b) that the wharf should in the first instance be narrower than is proposed, the godowns being placed on shore, (c) that the rail communication should be double from the start and not, as proposed, a single line until Scheme B is carried out; (d) that there should from the beginning be road communication with Port Swettenham in addition to rail.

The cost of the works contemplated (allowing for the lower estimate considered sufficient by the consulting engineers) may be taken at not more than £1,300,000, and the charge for interest and sinking fund would therefore be £78,000 per annum. The maximum capacity of the quay so provided should be about 350,000 tons per annum, and it is likely that a wharf limited to two berths would be considerably used. On the assumption that the movement of cargo over the quay would amount to some 300,000 tons per annum, the capital charges would work out at the comparatively high rate of about 5 shillings per ton.

The revenue and expenditure at Port Swettenham for the years 1928, 1929 and 1930 show that the excess of revenue which accrued in each of those years is not sufficient to carry any appreciable portion of this charge. A small increase in port dues might, however, be accepted without serious demur if there were an adequate *quid pro quo* in the shape of increased efficiency and quick despatch, although the committee does not think it desirable that the dues should be raised beyond those at Singapore and Penang. If, on the outward voyage, a day could normally be saved at Port Swettenham, that would be an appreciable advantage, for which it would be legitimate to make some charge.

As nearly half of the proposed capital expenditure will have been incurred in constructing the approaches to the new port and ought not entirely to be debited to the length of wharf undertaken in the first instance, it appears not unreasonable to assume that a portion of the capital charges should be borne, at least for a time, not by the trade of the port itself, but by the general revenues of the F.M.S. Government, with any assistance that may be given from Imperial funds.

In the course of the report the committee reviews the growth of the Port, pointing out that its trade is mainly import, the export trade of Malaya being rather concentrated at Singapore and Penang. So far as ocean liners are concerned, there is a wharf 1,000-ft. in length, but owing to difficulties of approach ocean-going vessels frequently lie in the stream and work their cargo from lighters.



Port Swettenham Wharf



Railway Station, Port Swettenham

The normal practice is for ocean-going vessels to leave Singapore or Penang in the evening and to arrive at Port Swettenham at dawn.

The bulk of the imports at Port Swettenham are from Europe, or, in the case of rice, from Burma, and the bulk of the exports are for Europe; thus the greater part of the imports is brought by vessels on the outward run and the greater part of the exports is taken by vessels on the homeward run. The length of stay at Port Swettenham is from one to three days on the outward voyage, varying according to the amount of cargo to be landed. On the homeward voyage vessels usually leave on the evening of the day of arrival.

On an average, therefore, the length of stay in the case of ocean-going vessels is somewhat less than two days, and as some 700 visit the port each year the normal requirements, if all discharge or load at a quay, would be served by a length of wharfage sufficient for four vessels. It is recalled that there was some congestion at the port at the end of 1928 and the beginning of 1929, due to conditions which are unlikely to recur for some time, but, while a recurrence is not anticipated, it is considered that the port should be ready to deal with an increased tonnage when trade revival comes and that steps should be taken now to provide a limited amount of additional accommodation for ocean-going vessels.

It is also understood that the construction of an east-to-west railway terminating at Port Swettenham is being considered, making it advisable that any scheme for the provision of additional facilities should be such as to admit of future extension.

"It has been represented to us in the evidence of the ship-owners," point out the committee, "that despatch is a prime consideration, especially under the conditions which hold at Port Swettenham, where most of the liners, at any rate, arrive from their previous port at dawn and endeavor to leave at nightfall. In order to avoid congestion at the ship's side the opinion has been expressed to us, based on practical experience at other ports, that prompt removal of cargo by rail is the most effective and certain means of securing this end.

"We think, therefore, that the rail communication from Port Swettenham should be doubled from the beginning, and thus the loss of space from the narrowing of the quay would be compensated by enabling full use to be made of the existing accommodation in the marshalling yards at Port Swettenham. We also consider it absolutely necessary that a roadway, at present only allowed for in the estimates for Scheme B, should be provided at once, since it would be impossible for the agents at Port Swettenham to maintain communication with the new wharves if the railway were the only available means of land transport between the two sites."

Railroad Building in the Philippines

(Continued from page 699).

Although more expensive than the modernly designed bridges, these arches were on hand and required no additional outlay. Other new features included concrete telegraph poles, copper wire, concrete pile bridges, heavier steel rails and stone ballast.

Both heavy grading and difficult bridging the engineers and the men took as a matter of course. Temperamental rivers which would suddenly rise 17 meters added to the excitement. The difficulty of keeping materials ahead of the rails where trails were few and far between kept the executives always on the alert. Malignant malaria would undoubtedly have taken its toll, excepting for an efficient medical department which required all employees to sleep under mosquito nets and which administered injections at the first sign of the disease.

In addition to the endless combat with the elements was the difficult task of keeping supplies moving steadily, not too fast and not too slowly, for the various jobs. Like a huge pattern to be worked out on nature's bosom, the job had to march forward, with tracks, bridges, water systems, stations, all coming in at definite places.

Nights in the rain and mud when a derailed material train was holding up the job further ahead. Hours of furious endeavor in a mad race to field-rivet a bridge before a rising river would carry it away. Feverished improvising when a part didn't fit or the organization had broken down somewhere along the line. All of these were details as the two ribbons of steel moved slowly northward.

Then there was the human element. The endless driving of the men to keep them at the task, yet the absolute necessity of keeping them contented. Moments of agony as workers in ticklish positions had to leap for their lives, for instance when a "coffer" dam blew. The shout of terror which went up when a man fell from a bridge and hurtled 20 meters through the air, only to be fished out of the water with little more than the wind knocked out of him.

For the engineers and the men alike, it was a wild hard life without luxuries and for their main reward the satisfaction of seeing visions take material form. When, in the years to come, a person leaves Manila at night aboard a luxurious sleeper and finds himself in Legaspi the next day, those engineers and workers will realize that their task has not been in vain.

Under General Manager Jose Paez, a competent crew of engineers directed by H. V. Campbell, a civil engineer procured for the project from J. G. White and company, has succeeded in one of the most outstanding achievements in Philippine railroad building. Their greatest source of pride, however, lies in the facts that there have been no serious accidents and not a single death and that the job is now a year ahead of schedule and below estimated cost.

Water-power and Electricity in the N.E.I.

(Continued from page 701)

In these figures 16 water-power stations and 21 other power works with more than 1,000 kw. capacity are included.

As the above summary shows, most of the capacity is installed in the caloric power-stations. The fuel supplies, e.g. wood, bagasse, coal and oil are obtained in the country.

For the actual supply of electricity a three phase alternating current of 50 cycles per second is mainly employed. The principal voltages applied are: 25,000 to 30,000 volts and 70,000 volts for transmission, 6,000 volts for generation and primary distribution, 220/127 and 190/110 volts for secondary distribution (four-wire system). Direct current is employed only in small private plants and for electrical traction.

In 1923 the following voltages and frequency were adopted as the standard:

Principal system for transmission and distribution: three phase alternating current of 50 cycles per second.

For distribution of three phase alternating current with low-tension the four-wire system is employed, except for special power-installations.

Standard voltages for three phase alternating current are: 127, 220, 380 (for large industrial power-installations), 6,000 and 3,000 volts. Higher voltages have not yet been standardized. Secondary standard are: 110, 190, 500, 3,000, 15,000 and 25,000 volts.

Standard voltages for direct current are: 110, 220 and 600 volts. Secondary standard is 440 volts for power.

Until a few years ago the rates for general supply of electricity charged by the public electric utilities were chiefly flat rates, based on the number and size of the apparatus connected (lamps, motors, etc.), in few instances meters were used. These rates, however, have now been replaced for the most part by more modern two and three charge rates, based on the power reserved by the consumers and on the consumption. The change has meant a great step forward in the use of electricity for all kinds of purposes, while the prospects of further development appear very favorable.

Proposal Made to Develop Water Power in the Philippines

From the Manila Bulletin

A PROPOSAL to launch an enterprise to develop water power in the Philippines on a major scale has been put forward in the form of a Senate measure sponsored by Senator Sotero Baluyut, who is one of the two engineers who are members of the Philippines Senate. The purpose of Senator Baluyut's bill is the creation of a quasi-public corporation to be called the National Electric Power and Development Company to exploit the water power of the Islands.

The Baluyut bill would finance the proposed National Electric Power Company with a capital stock of P.35,000,000 which is to be drawn from the unexpended authorized capital of the National Development Company. The power and light corporation would be placed under the National Development Company like the Cebu Portland Cement Company.

From Stock Sale

The P.35,000,000 proposed capital, however, will have to be raised from sale of shares of stock of the National Development Company, because this outstanding authorized capital has not been sold or paid for.

Senator Baluyut's explanatory note is as follows:

"Our country, besides being rich in natural resources is blessed with various forms of natural power. This potential force, instead of remaining idle, should be harnessed and utilized for the creation of wealth which would insure a greater degree of happiness for our people.

"At present, we are importing coal and crude oil, spending enormous sums of money annually. The slow growth of our industries may be attributed to the lack of local coal and crude oil, or other cheap fuel to operate our factories and industries at low cost, and at a profit. This state of affairs necessarily discourages the establishment of new industries, essential to our economic development, and may in time prove fatal to the life of our growing concerns. The author of this bill is of the opinion that by exploiting and utilizing our natural forces and water power, such as rivers, falls, and other forces of nature, we will not only reduce the expenditures for imported fuel to its minimum, but above all, capital will be given proper stimulus to create new industries. And by creating new industries, we will help solve the unemployment problem ameliorating in a way the pangs of the present economic depression.

To Serve Poor

"The great majority of our people in the provinces do not enjoy the same convenience and comfort as those inhabiting our cities and big towns. Electric light and electric power can be produced cheaply in this manner, and therefore a moderate charge will just fit the small pockets of our less fortunate countrymen, who, otherwise cannot afford to pay for such comfort and convenience. Let us then put this comfort and convenience within the reach of every-body.

"Besides, the National Development Company has at its disposal fifty million pesos (P.50,000,000); only seven million (P.7,000,000) of which has been so far spent for its purposes. From the remaining forty-three million (P.43,000,000) the sum of thirty-five million (P.35,000,000) can be conveniently set aside in order to invest it for this most urgent need.

U. S. Watching

"The advent of a new era in our history as a people has been heralded by the cry for economic development. The call resounded its echo through the length and breadth of the country. Its intensity and significance is only paralleled by the loud cry for political emancipation. To these two ideals, our people are ready and willing to give the fullest measure of devotion.

"America is watching keenly with scrutinizing eyes as we are unfolding to her and to the civilized world our ability and power for constructive leadership, aiming to utilize the great resources of our country, its possibilities transformed into tangible realities for us and for posterity.

"My answer to this call for economic development is embodied in this bill."

The full text of the bill follows:

"Be it enacted by the Senate and the House of Representatives of the Philippines in Legislature assembled and by the authority of the same:

"Section 1. A company is hereby created, which shall be known as the "National Electric Power and Development Company," and which to all intents and purposes shall be under the control and management of the "National Development Company" as created by Act numbered twenty-eight hundred and forty-nine of the Philippine Legislature.

"Sec. 2. It shall be the purpose of the National Electric Power and Development Company to establish hydro-electric power plants in order to produce, generate, supply, and maintain electric fluid. The hydro-electric power plants shall derive their power principally from the Agno River or from other rivers, water falls, or from other bodies of water within the Philippine Islands which may be utilized for the said purpose.

"Sec. 3. Upon the establishment of such hydro-electric power plants as provided in the next preceeding section, the National Development Company, under whose control and management this company created by this Act is placed, shall be empowered to enter into contracts with any person or persons, natural or juridical, in order to supply and maintain electric fluid, under the conditions which may be imposed by the Public Service Commission.

"Sec. 4. For the purpose of this Act and from the remaining funds of the National Development Company, not otherwise destined for other ends, there shall be set aside the sum of thirty-five million pesos: Provided, however, That the Insular Auditor shall not set up said sum on his books in full, but only such part or parts thereof as it may be necessary to invest for the object of the company created by this Act.

"Sec. 5. All Acts or parts of Acts inconsistent with this Act are hereby repealed.

"Sec. 6. This Act shall take effect upon its approval."

Vehicular Ferry at Hongkong

A proposed vehicular ferry at Hongkong will, if possible, commence operations as from January 1, 1933, and the Government is prepared to offer the exclusive maintenance thereof for a period of fifteen years from that date, according to the *Government Gazette*.

Tenders are now being called for, and must reach the Colonial Secretary's Office not later than January 4, 1932.

The ferries are to run between Jubilee Street Pier and Jordan Road Pier; Jubilee Street Pier and Mongkoktsui Pier; and Jubilee Street Pier and Samshuipo Pier.

The vessels for the service, other than special type vessels, must be steam or motor, of a service speed of not less than 10 knots. The special type vessels must be fitted with Diesel engines. The ordinary vessels must during the first year be sufficient in number to maintain a ten-minutes' service and have accommodation for not less than 250 passengers. During the second and subsequent years must be sufficient to cope with all traffic requirements.

Tenders, if individuals, must be British subjects, or if firms or companies, the majority of the partners or directors must be British subjects. The management and staff, or an effective majority thereof to the satisfaction of the Governor-in-Council, must also be British subjects, and the control must be within the Colony and be essentially British.



The "Sansei Maru" on her Trial Run

The New Cargo Motor Ships "Santo Maru" and "Sansei Maru"

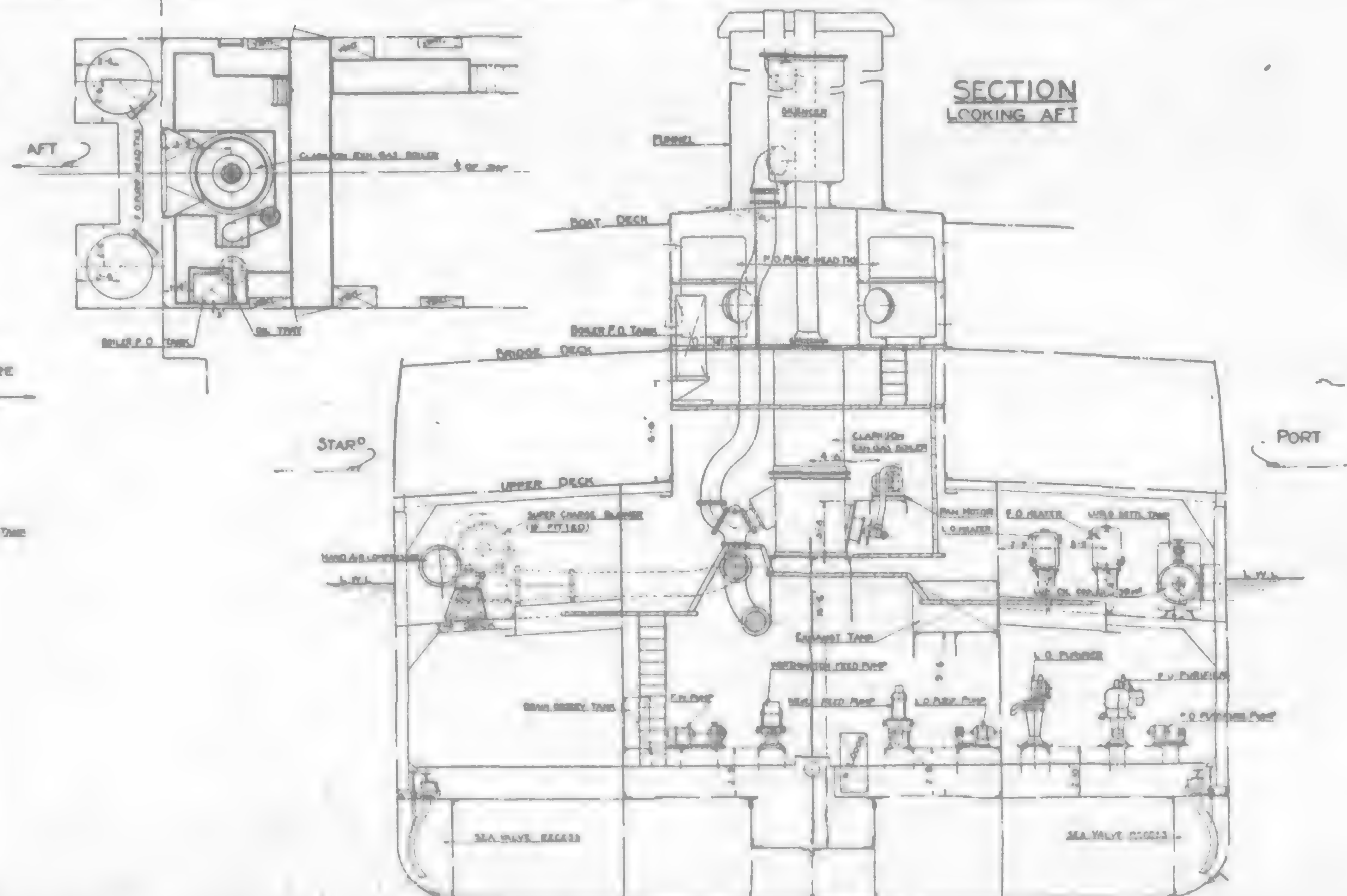
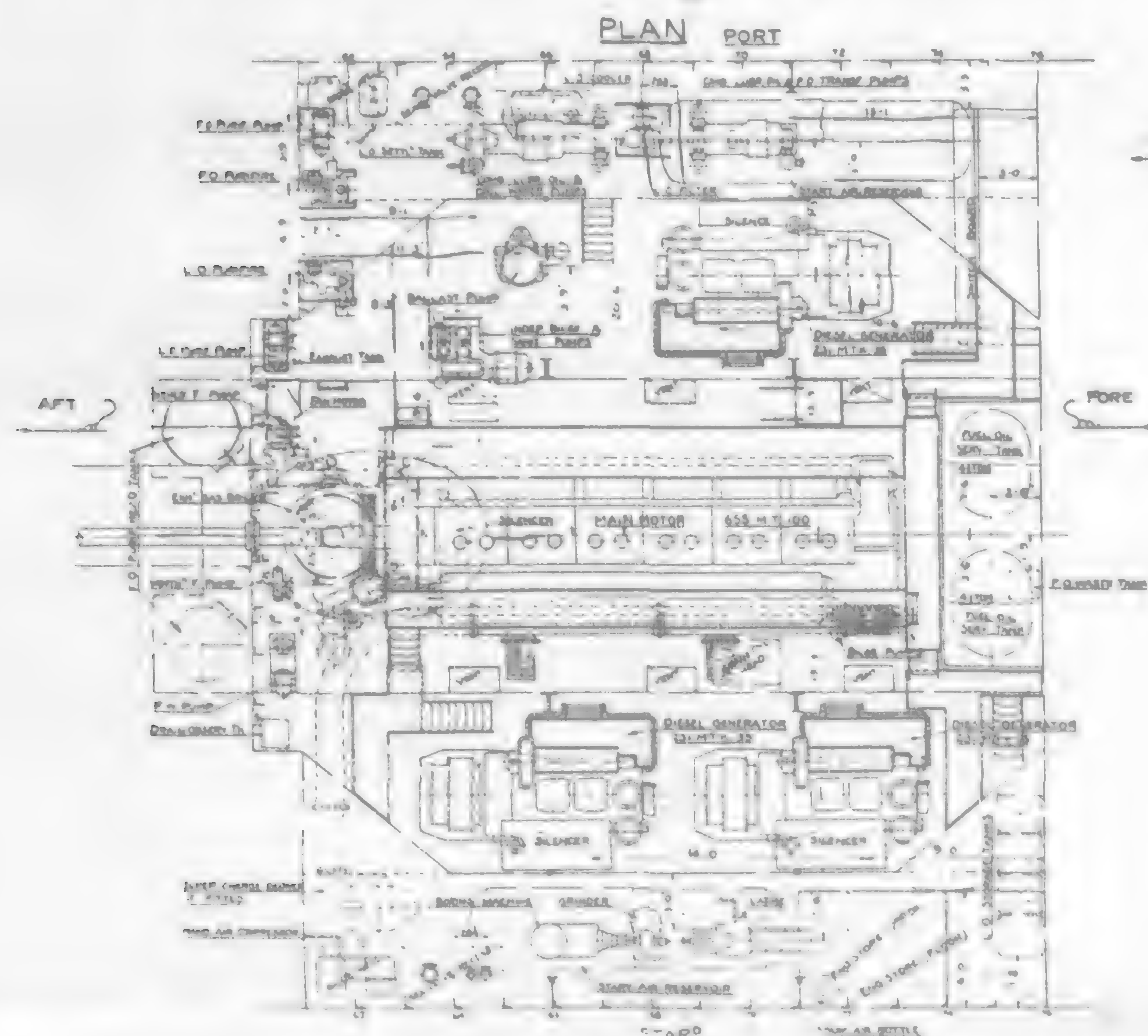
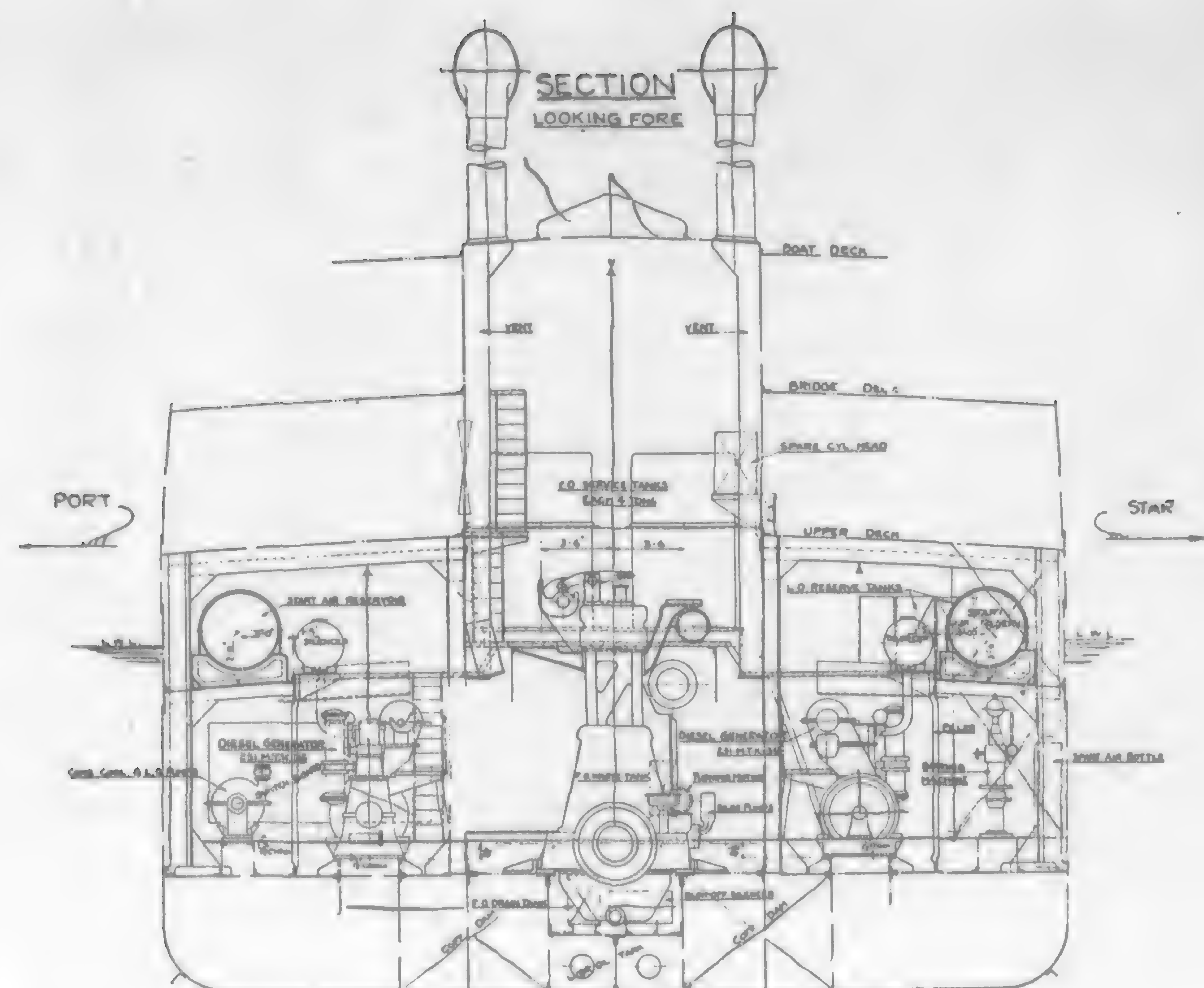
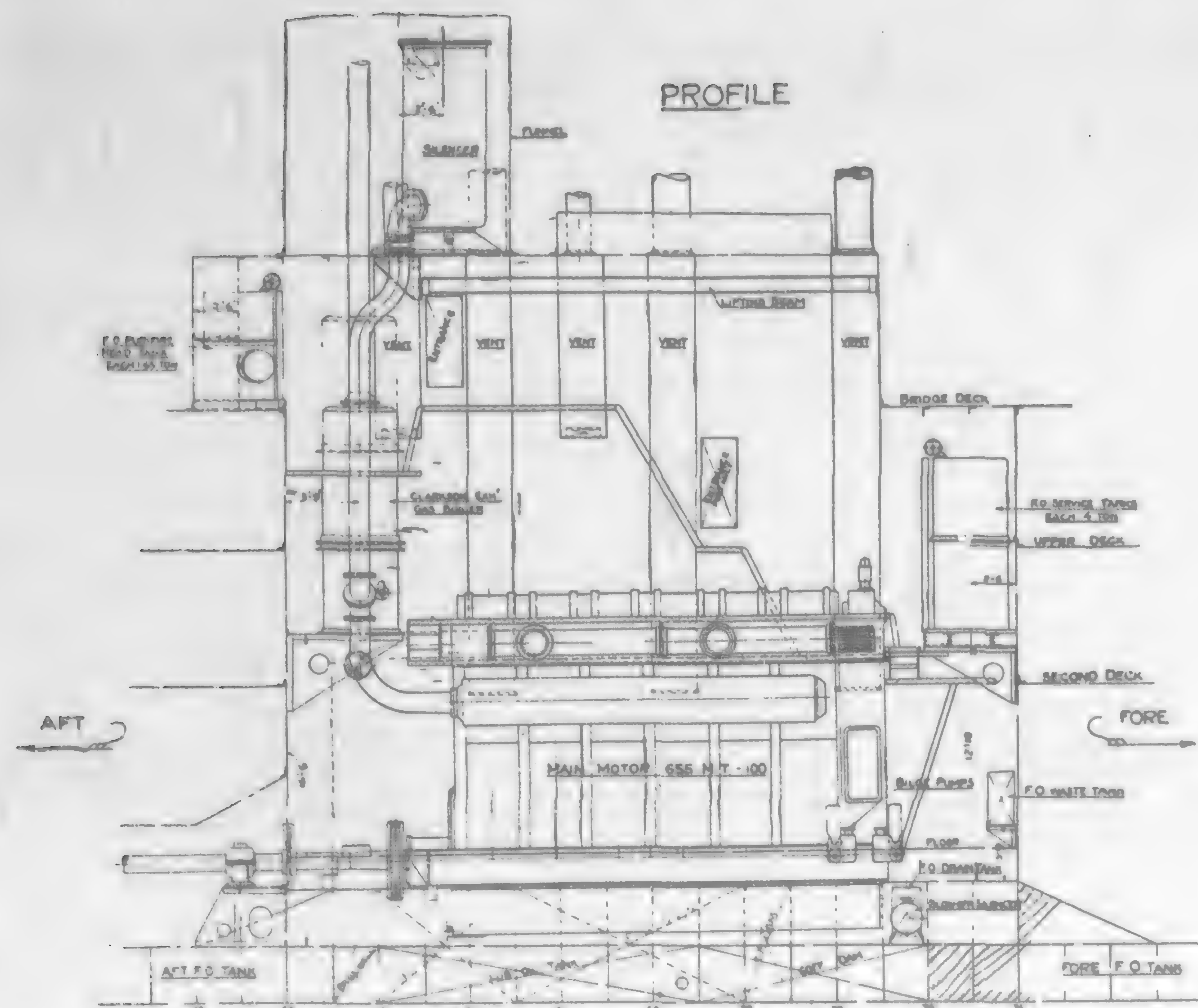
For the Oriental Service of the Dairen Kisen Kaisha—Equipped with Mitsui-B. & W. Single Acting, Four Cycle, Solid Injection, Trunk Piston Diesel Engine

By Y. TAJI, M.Eng., M.I.N.A., M.I.Mar.E.

THESE new vessels have been built and engined by the Tama Dockyard of Mitsui Bussan Kaisha, Ltd. to the order of the Dairen Kisen Kaisha, Ltd. for their China-Japan-South Seas Service with Dairen as the central and starting port. They are sister ships of the *Kanan Maru* and *Kahoku Maru* built in the Mitsubishi Nagasaki Shipyard, but the propelling machinery is of quite different type.



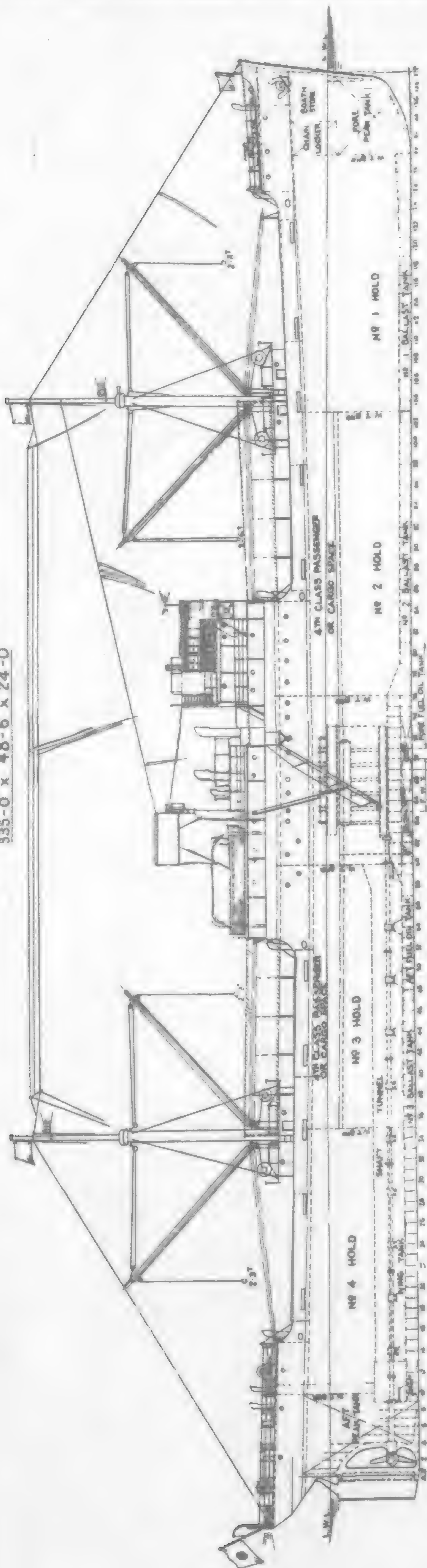
The "Santo Maru" on her Trial Run



General Machinery Arrangement of the "Santo Maru"

M. S. SANTO MARU
GENERAL ARRANGEMENT

SCALE 1/16 INCH TO ONE FOOT
335'-0" x 48'-6" x 24'-0"



M.S. "Santo Maru" General Arrangement

The *Santo Maru* was laid down on November 1, 1930, launched on April 15, 1931 and completed on May 31, 1931, while the *Sansei Maru* was laid on December 6, 1930, launched on May 14, 1931 and completed on June 30, 1931.

Principal Particulars and leading characteristics are as follows :—

Length over all	...	...	349-ft. 9-in.
Length between perps.	...	...	335-ft. 0-in.
Breadth moulded	...	...	48-ft. 6-in.
Depth moulded	...	...	24-ft. 0. 57-in.
Gross tonnage	...	...	3,234 tons
Net tonnage	...	...	1,820 tons
Under deck tonnage	...	...	2,724 tons
Dead weight capacity	...	...	4,888 tons.

'Tween deck heights :—

Bridge deck	...	...	7-ft. 9-in.
All others	...	...	7-ft. 6-in.
Trial speed	...	...	13.10 knots.
Service speed	...	...	11 knots.

Engines :—

One set of Mitsui-Burmeister and Wain Diesel engine. Normal output. 1,400 b.h.p.

R. P. M.

140.

The vessels have been constructed under special survey of the Japanese Ministry of Communications ("Teishinsho") as well as Lloyd's Register of Shipping, and are classified by the former as "First Class Ocean-Service Steel Cargo Vessels," while by the latter as "X100A1. with L.M.C."

It is noteworthy that the route served by these ships being of a special character, two state rooms, compradores' compartments and the fourth class spaces for a great number of Chinese coolies transported between Shantung and Manchuria are arranged with necessary cooking and sanitary equipments.

Hull Construction and General Arrangement

The vessels have a forecastle, bridge erections and a poop. The stem is slightly raked, while the stern is elliptical, fitted with an Oertz rudder. There are fore and aft twin posts connected with truss work at their tops and poles at centers utilized as the fore and main masts, each post being fitted with two derrick booms. The funnel is upright and dumpy, a silencer of the main engine and a chimney of donkey boiler are installed therein.

The ships' model was tested in the Experimental Tank of the Ministry of Communications in order to ensure a minimum resistance for the propulsion. The vessels are very smart in appearance and unusually comfortable in accommodations for cargo ships.

The upper deck being taken as the strength deck, it extends continuously over the whole length of ship, while the second deck is only partial, covering No. 2 hold, engine room and No. 3 hold.

The double bottom extends over the whole length of ship, holding a height of 3-ft. 4-in. except under the engine room where it is raised to 6-ft. 6-in., and is utilized as ballast tanks, fuel oil tanks, lubricating oil tanks, fresh water tanks, etc.

The hull is subdivided, by six watertight bulkheads extending to the upper deck, into a forward peak tank, No. 1 hold, No. 2 hold, and engine room, No. 3 hold, No. 4 hold and an aft peak tank.

The bridge erections amidships comprise a flying bridge, an upper bridge deck, a boat deck and a bridge deck. On the flying deck are a chart-house and a wheel-house fitted with all necessary navigation and communication apparatus. The captain's room, a wireless telegraphy room, second and third officer's rooms and a state room are arranged on the upper bridge deck. On the forward part of the bridge deck are a cosy saloon, a state room, first officer's room, a steward's cabin, officers' lavatory and bath, whilst the aft part is for the engineer officers' accommodation comprising the chief engineer's room, first, second, third and fourth engineer's cabins, apprentices' cabin, a tally office, a mess-room, a Japanese galley, engineers' lavatory and bath.

On the upper deck amidships under the bridge deck are a large compradore's compartment, petty officers' cabins, crew's, oilers' and wipers' compartments, crew's mess-room, compradore's Chinese galley and crew's Japanese galley, W.Cs., bath, etc.

All rooms are fitted with electric lamps, oil lamps, electric fans, steam or electric heaters, etc., and special care is taken for

the ventilation, heating and lighting and for the general comfort of passengers, officers and crew.

Besides of two state rooms and compradores' compartments, there are 4th class coolie passengers' spaces which can be utilized as cargo spaces, while W.Cs., etc. are arranged in the fore and aft winch houses. Owing to special nature of the service, Japanese, Chinese and European galleys are provided.

Cargo Facilities

Dead weight capacities of the *Santo Maru* and the *Sansei Maru* are 4,888 tons and 4,885 tons respectively, whilst the cargo capacity is 237,988 cub. ft. (grain) or 220,167 cub. ft. (bale). Cargoes to be handled are of great varieties, such as coal, corn, pig-iron, and general goods.

There are four cargo holds and two 'tween deck cargo spaces (turnable to the fourth class spaces), for which hatchways and derricks are arranged as follows:—

Hatchways	Size.	Derricks	
		Capacity.	Number
No. 1	29-ft. 3-in. × 22-ft. 0-in.	3 tons.	2
No. 2	30-ft. 0-in. × 22-ft. 0-in.	6 tons.	2
No. 3	" "	3 "	2
No. 4	" "	3 "	2

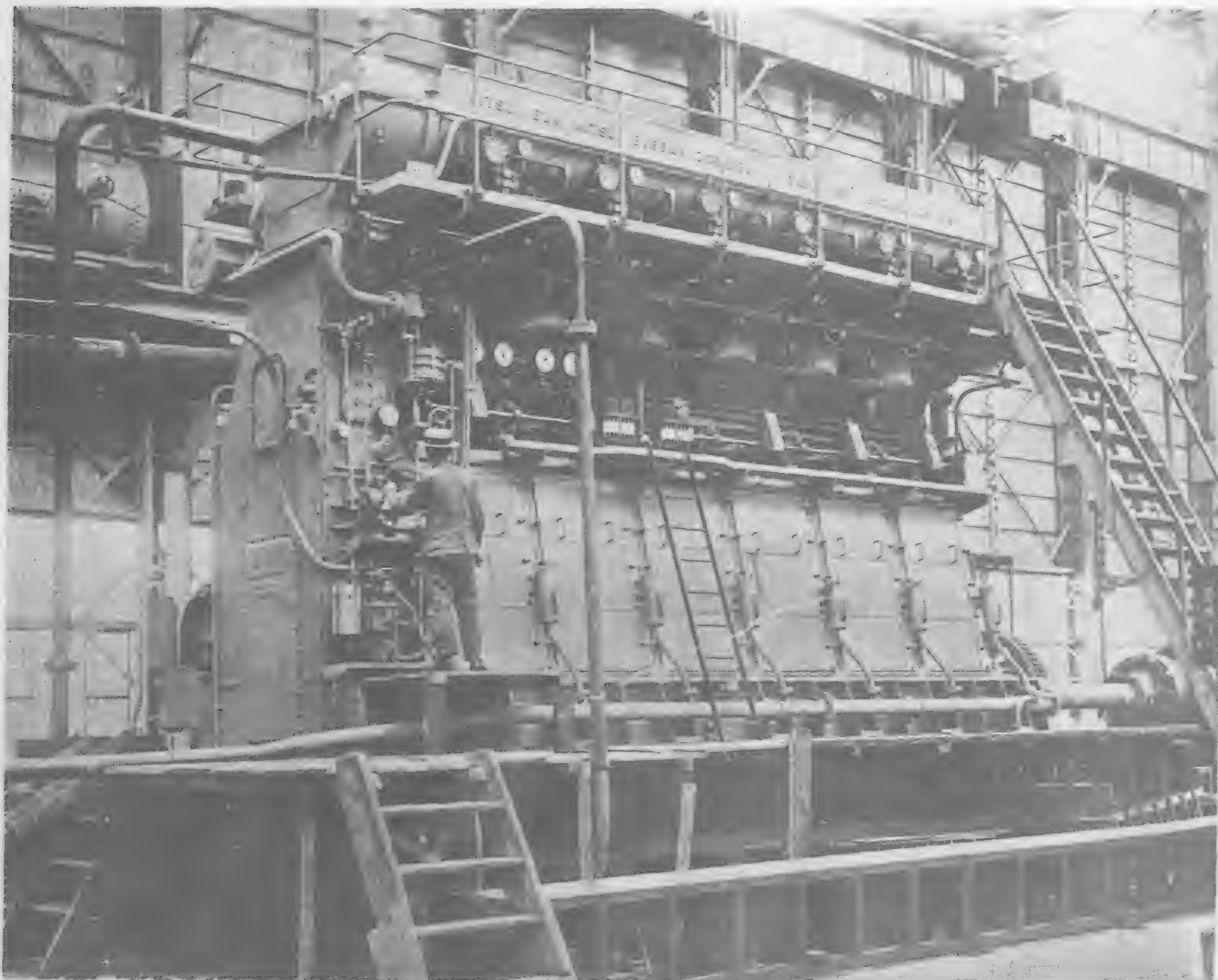
There are eight 3 ton electric winches and one 3.5 ton electric winch on the fore and aft winch platforms and on the poop. These were supplied by the Shibaura Electrical Engineering Works, Ltd. The 3 ton winches are of double herical gear type driven by electric motors of 26 h.p. at a lifting speed of 100-ft. per min. at 450 r.p.m., whilst 3.5 ton winch is of the same type and power, but at a speed of 85-ft. per min.

Steering, Anchoring and Mooring Arrangements

The steering gear is of Hele-Shaw electric-hydraulic type with two working rams, supplied by John Hesties and Co. of Greenoch, operated by Hele-Shaw pumps and an 8 h.p.-220 volt electric motor of enclosed type and controlled by MacTaggart Scott telemotor system from either the navigation bridge or poop deck. For emergency purposes a hand steering gear is provided.

The windlass is of Clarke, Chapman's latest electric type suitable to handle anchor cables of 2-in. diam., the capacity being 10 tons at a hauling speed of 25-ft. per min., for that a 38 h.p.-220 volt electric motor of ventilated type is installed in the windlass motor space under the forecastle deck.

A 3.5 ton electric mooring winch with long warping ends is also installed on the poop deck, and all necessary fittings for mooring the ship are conveniently arranged on the exposed decks.



Main Engine of Motor Vessel "Santo Maru" on Test Bed. It is of Mitsui-Burmeister and Wain Single Acting, Four-Cycle, Solid Injection Direct Reversible, Trunk Piston 655-MTF-100 Type with Six Cylinders Developing Normally 1,400 b.h.p. or 1,660 i.h.p. at 140 r.p.m.

Navigation, Communication, Life-saving and Fire Extinguishing Appliances

All necessary apparatus such as compasses, steering standards, engine telegraphs, docking and steering telegraphs, voice pipes, sounding machine, logs, anchor telegraph, etc., are fitted on the flying bridge.

The wireless telegraphy and telephony apparatus comprises one set of 1 k.w. valve type and a $\frac{1}{2}$ k.w. spare spark set, both were supplied by Adachi Wireless Apparatus Manufacturing Co. Accumulators of 12 volts-50 ampere-hours are provided for emergency lighting and the wireless apparatus.

As to the life-saving appliances, two 26.1-ft. life-boats and one 17.6-ft. "Temma" are stowed on the boat deck, these being handled by turning davits and a winch. Necessary number of life jackets, buoys, etc., are also provided.

The fire extinguishing is effected by steam system with steam pipes led to every cargo hold.

Main and Auxiliary Machinery

Main Engine.—The main propelling machinery is one set of Mitsui-Burmeister and Wain single acting, four cycle, solid injection, direct reversible, trunk piston 655-MTF-100 type with six cylinders of 550 mm. in bore and 1,000 mm. in stroke, developing normally 1,400 b.h.p. or 1,660 i.h.p. at 140 r.p.m. The maximum working pressure is 37 kg. per sq. cm. or 550 lb. per sq. in.

Auxiliaries directly attached to the main engine are six fuel injection oil pumps, one pumping-up pump, one bilge pump of 15 tons per hour, one sanitary pump of the same capacity, etc. The turning wheel is 1,362 mm. in diam. and 820 kgs. in weight, worked by a 3 h.p. electric motor through worm gearing, whilst the crank shaft is 350 mm. in diam., bearings being arranged at a distance of 730 mm. measured between inner edges.

Cooling of the engine is effected by sea water and the lubrication is of a forced system, for that a combined forced lubricating oil and cooling water pump, a combined daily supply fuel oil and forced lubricating oil pump, etc. are provided. The former comprises a forced lubricating oil pump of 30 tons per hour of double herical gear type and a centrifugal cooling water pump of 80 tons per hour direct driven by a 20 h.p.-220 volt D.C. semi-enclosed compound wound motor at 500 r.p.m., whilst the latter embodies a daily supply fuel oil pump of gear type of 15 tons per hr. and a forced lubricating oil pump of double herical gear type of 30 tons per hr., driven by a 15 h.p. electric motor through chain gearing.

Starting air is supplied by a Diesel driven air compressor of two stage type with a H.P. cylinder of 280 mm. and a L.P. cylinder of 320 mm. in bores at a maximum air pressure of 25 kg. per sq. cm., the capacity being 240 cub. meters per hour. Further, one hand driven two stage air compressor is provided, the capacity being 30 litr. at 90 r.p.m. at 25 kg. per sq. cm.

There are two starting air reservoirs of a diameter 4-ft. and a length of 16-ft., each having a capacity of 190 cub. ft. or 5.38 sq. meters at a working pressure of 25 kg. per sq. cm. For auxiliary Diesel engines, one starting air bottle of 400 mm. in diam and 2,200 mm. length and of a capacity of 250 litres at a working pressure of 25 kg. per sq. in. is provided.

A silencer for the main engine is installed in the funnel, its size being 4-ft. 6-in. in diam. and 10-ft. 4-in. in length. Silencers for auxiliary Diesels are directly fitted to the engines.

The main engine is designed to be superchargeable, if necessary and a space for the blower is reserved on the second deck platform.

Electric Generating Plant.—There are three sets of generators installed in the engine room. The driving engines being B. & W. 231-MTHK-35 type single acting four cycle solid injection non-reversible trunk piston Diesel engines with two cylinders of a bore 310 mm. and a stroke of 350 mm., developing 100 b.h.p. at 400 r.p.m. each. The dynamos are of multipolar compound wound type of 60 kw. at 220 volts, D.C., supplied by the Shibaura Electrical Works, Ltd.

Steam Generating Plant.—A Clarkson's exhaust boiler is installed on the second deck platform of the engine room. The boiler has a mean diameter of 4-ft., an overall height of 13-ft. 2.7/8-in. and a heating surface of 250 sq. ft., the working pressure being 100 lb. per sq. in. In case that the engine is not running, an oil burner with Clyd low pressure air system can be used for generating steam.

A Worthington steam driven vertical duplex feed pump and a Weir feed pump are provided to the boiler.

Various Engine Room Auxiliaries.—Apart from those mentioned above, the following auxiliaries are installed in the engine room :—

One set of electric driven worm geared bilge and sanitary pumps of reciprocating plunger type, each having a capacity of 20 tons per hour at 100 r.p.m., the motor being Hitachi's 10 h.p.-220 volt semi-enclosed compound wound type at 1,200 r.p.m.

One—Mitsubishi-Drysdale electric centrifugal ballast pump of 150 tons per hour, driven by an 18 h.p. motor.

One—Electric driven fresh water pump of two stage turbine type of 4.5 tons per hour at a head of 70-ft.

One—Sharples fuel oil purifier of Presurtite No. 5A type driven by a $1\frac{1}{2}$ h.p. motor at 17,000 r.p.m., capacity being 150-300 gallons per hour.

One—Sharples lubricating oil purifier of Standard No. 5A driven by a $1\frac{1}{2}$ h.p. motor, capacity being same.

One—Electric geared pump for the fuel oil purifier, driven by a $\frac{1}{4}$ h.p. motor at 1,800 r.p.m., capacity being 2.5 tons per hour.

One—Electric geared pump for the lubricating oil purifier, capacity 4.5 tons.

One—Lubricating oil cooler of single flow circular type with a cooling surface of 367 sq. ft.

One—Hand driven fuel oil stand-by wing pump.

One—Lubricating oil stand-by wing pump.

Further, one 6-ft. lathe, one 24-in. drilling machine, one wet and dry grinding machine and other necessary tools are provided in the engineers' workshop, these being driven by a 2-h.p. electric motor through belting.

There are also two 4,500 kg. settling tanks, one 550 kg. lubricating oil purifier tank, two 1,900 kg. purifier head tanks, one 110 gallon boiler fuel oil tank, etc., all being fitted with electric heaters of a capacity from 2 to 18 kw.

Propeller and Shafting.—The propeller is of a detachable four bladed type with aerofoil sections, the blades being of manganese bronze and the boss of cast steel, with a diameter of 11-ft. 2 $\frac{1}{2}$ -in., a pitch of 8-ft. 4.7-in., a developed area of 40 sq. ft. and a mean pitch ratio 0.7515.

The shafting comprises a thrust shaft of 960 mm. long, 340 mm. in diameter with three collars of 620 mm. in diam. five intermediate shafts of 9 $\frac{1}{2}$ -in. in diam. and 25-ft. long, and one tail shaft of 10 $\frac{1}{2}$ -in. in diam. and 21-ft. 2 $\frac{3}{4}$ -in. in length. These were supplied by the Kobe Steel Works and the Nippon Steel Works.

Trial Results

Progressive and full power official trials of the *Santo Maru* were carried out off measured mile posts on the Inland Sea on May 21, and 23, 1931, respectively, while the official trial of the *Sansei Maru* was held on June 22, 1931.

The *Santo Maru* at the official trial acquired a mean maximum speed of 13.025 knots with 1,809.5 i.h.p. at 153 r.p.m., whilst the *Sansei Maru* obtained 13.168 knots with 1,784.95 i.h.p. at 151.5 r.p.m. The performance of the ships and engines at various trials were entirely satisfactory to both the owners and shipbuilders.

The particulars of the official trials of these two ships are given below :—

PARTICULARS OF OFFICIAL TRIAL TRIPS

Name of Ship	The <i>Santo Maru</i>	The <i>Sansei Maru</i>
	off Tsuda,	
Place and mile posts	1.042 M.	Do.
Date	May 23, 1931	June 22, 1931
Weather	fine	fine
Sea	Smooth	Calm
Draught	{ fore ... 6-ft. 2-in. }	Do.
	{ aft ... 11-ft 8-in. }	
	{ mean... 8-ft. 11-in. }	
Corresponding Displacement, Tons.	2,852	Do.
Midship Area, sq. ft.	414	Do.
Mear Speed, Knots	13.025	13.168
Total i.h.p. (inoldg. Diesel Aux.)	1,881.1	1,857.5
R. P. M., mean	153	151.5
Slip, %	2.802	4.569
Fuel oil consumption per hour, kgs.	270.87	269.8
Ditto per i.h.p. per hour, gms.	144.	145.2
R.P.M. of Main Engine at Dead slow	56.	57.
Kind of fuel and Specific gravity	{ Californian } { 0.898 at 25°C. }	Do.

The New Motor Oil Tanker "Ogura Maru No. 2"

By Y. TAJI, M.I.N.A., M.I. Mar E.

THE *Ogura Maru No. 2* is a solely Japanese built oil tanker with the most up-to-date equipment for this class of vessel and with various improvements to the first ship *Ogura Maru No. 1*. Both the hull and machinery were built in the Mitsubishi Nagasaki Shipyard to the order of the Ogura Petroleum Co., Ltd., which now owns three very modern oil tankers with an aggregate capacity of 31,917 tons.

The vessel was laid down in the Nagasaki Shipyard on June 11, 1930, launched on December 9, 1930 and completed on February 17, 1931. After completion, the vessel was exhibited in the Yokohama Harbor for demonstration.

The principal particulars are as follows:—

Length over all	...	...	447-ft. 0-in.
Length between perpendiculars	...	...	430-ft. 0-in.
Breadth moulded	...	...	57-ft. 0-in.
Depth moulded to upper deck	...	...	34-ft. 6-in.
Gross tonnage	...	...	7,311 tons.
Registered tonnage	...	...	5,050 tons.
Dead weight	...	...	10,600 tons.
Cargo oil capacity (including summer tanks)	...	...	466,900 cub. ft.
General cargo capacity	...	...	51,500 "
Load draught	...	...	27-ft. 0-in.
Mean trial speed	...	...	14.15 knots.

Engine:—

One set of the Mitsubishi-Sulzer single acting two cycle Diesel engine of Type 6ST60.

Normal output. ... 2,300 b.h.p.

Corresponding r.p.m. ... 112.

The vessel was built in compliance with the requirements of the Japanese Ministry of Communications (under "Teishinsho Rules,") and also under special survey of the Imperial Marine Corporation, and is classified by the latter as a N.S.* (oil carrier) and by the British Corporation as B.S.*.

General Arrangement and Hull Construction

The vessel was constructed in accordance with the Foster King's System, and has two complete steel decks extending over the whole length of the ship, a bridge deck, a forecastle and a poop, the stem being straight and the stern elliptical. Her form of body was specially designed after model tests in the experimental tank



M.S. "Ogura Maru" on Trial

of the Nagasaki Dockyard in order to minimize the propulsive resistance and to ensure the consequent saving of fuel oil. A double plated stream line rudder and a "Contra Propeller" are fitted.

In view of the importance of cargo oil handling, special care was taken for the arrangement, equipment and construction of oil tanks. Powerful cargo oil pumps, the complete cross-over system for piping, tank heating arrangement, coaching ejector fire-prevention system, oil loading and unloading system, tank cleaning system, etc., are provided after the most up-to-date design.

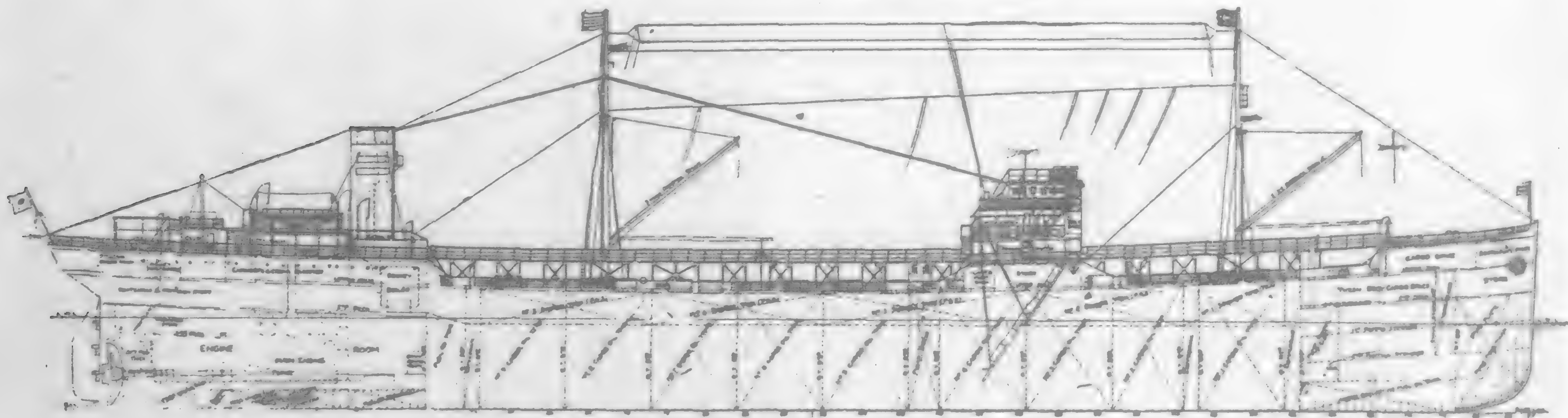
Cargo oil tanks are arranged in both sides of the center line bulkhead and are subdivided into 18 compartments by transverse O.T. bulkheads. There are five summer tanks in each side on the second deck, provided with wash plates.

The main pump room is arranged near amidships installed with two powerful heavy cargo oil pumps and one light oil pump, and a smaller pump room in the port side of the forward general cargo hold, which is on the front of No. 1 cargo oil tank and is provided with two large hatchways and two efficient cargo winches. Two more steam winches are installed for the handling of oil hoses and for the mooring of the ship as well as for the embarkation of provisions.

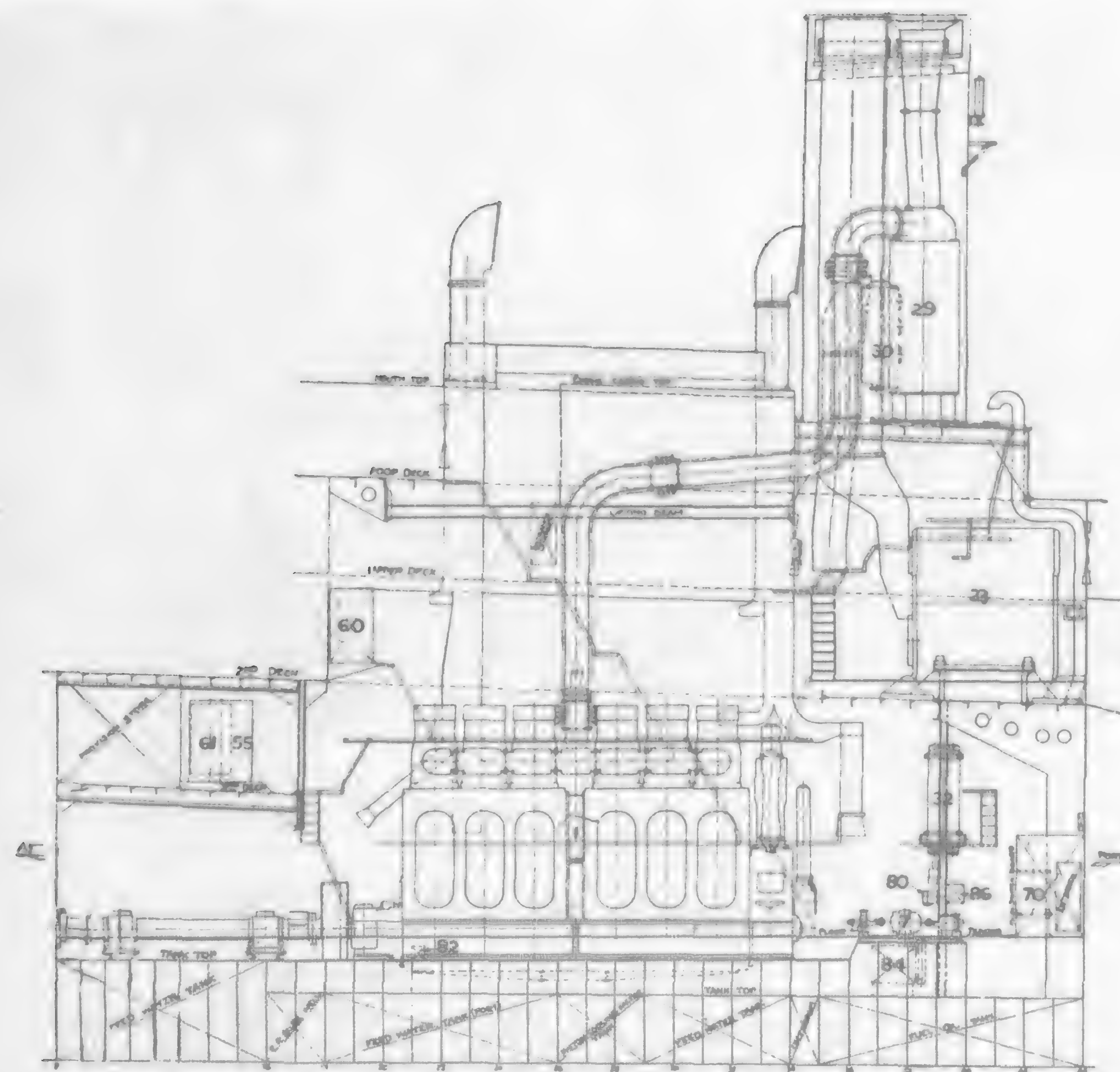
Special attention should be given to the adoption of the "Macanking" steel hatch covers which were made by the Nagasaki Dockyard under licence of Macgregor & King Co., this being the first attempt on a Japanese ship.

Double bottoms are arranged under the engine room and the forward general cargo hold, for the storage of fresh water and fuel oil, whilst the latter can be utilized as a ballast tank whenever necessary. The fore and aft peak tanks can be used as ballast tanks for the adjustment of trim. Further, large fuel oil tanks being provided in the front of the engine room, sufficient fuel oil is stowed for a long voyage.

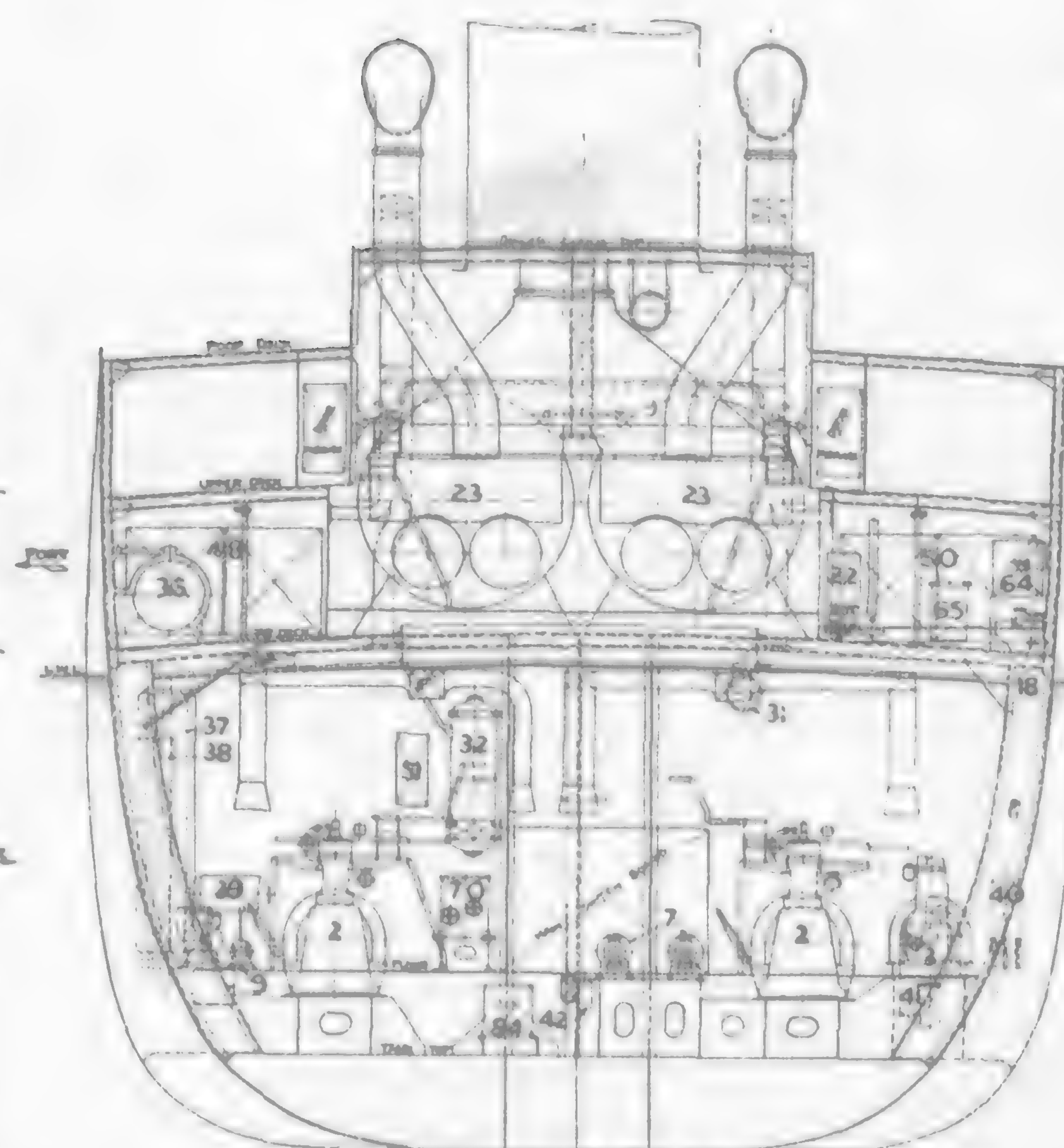
M.S. OGURA MARU No 2
GENERAL ARRANGEMENT



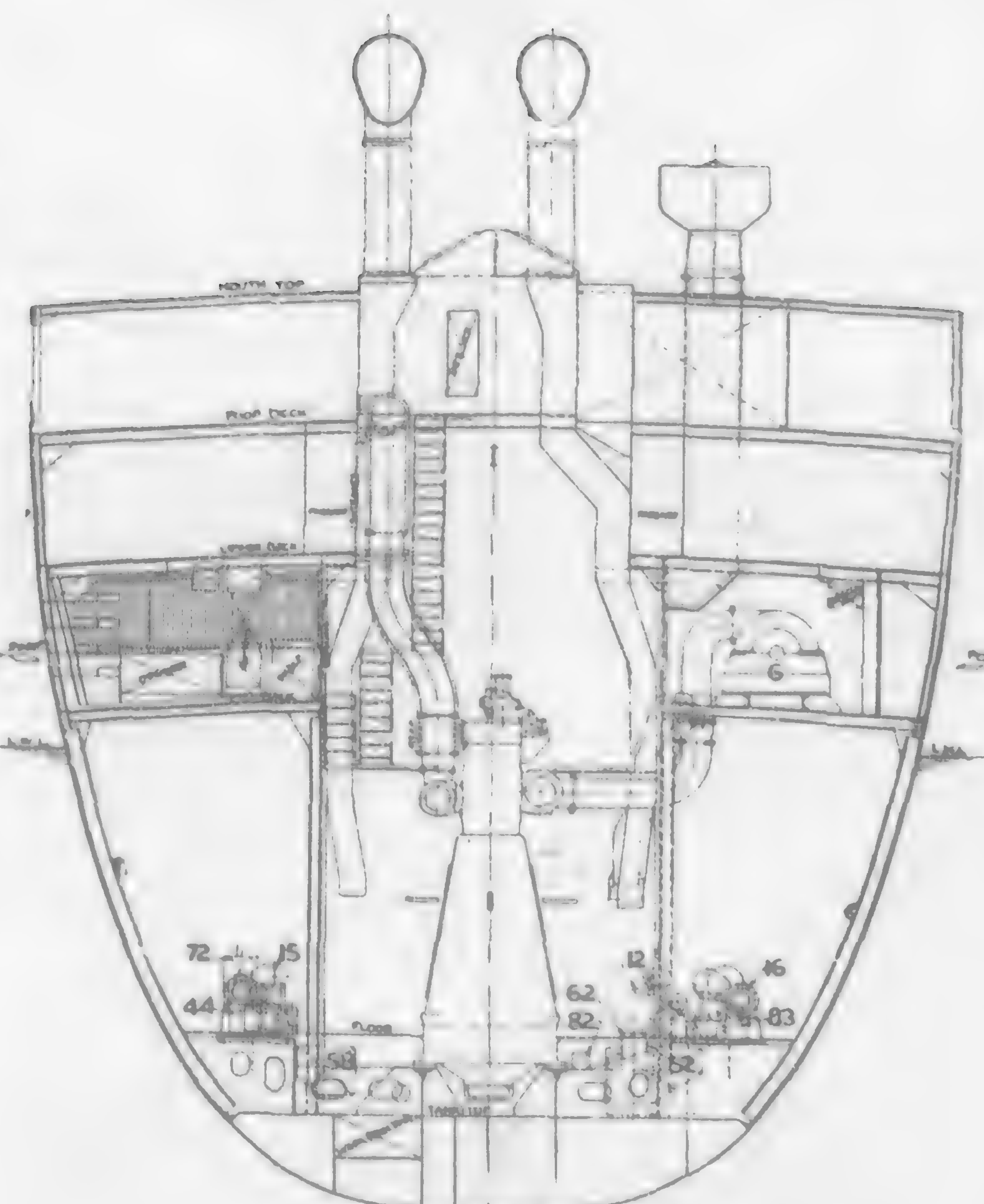
OGURA MARU No. 2. MACHINERY ARRANGEMENT



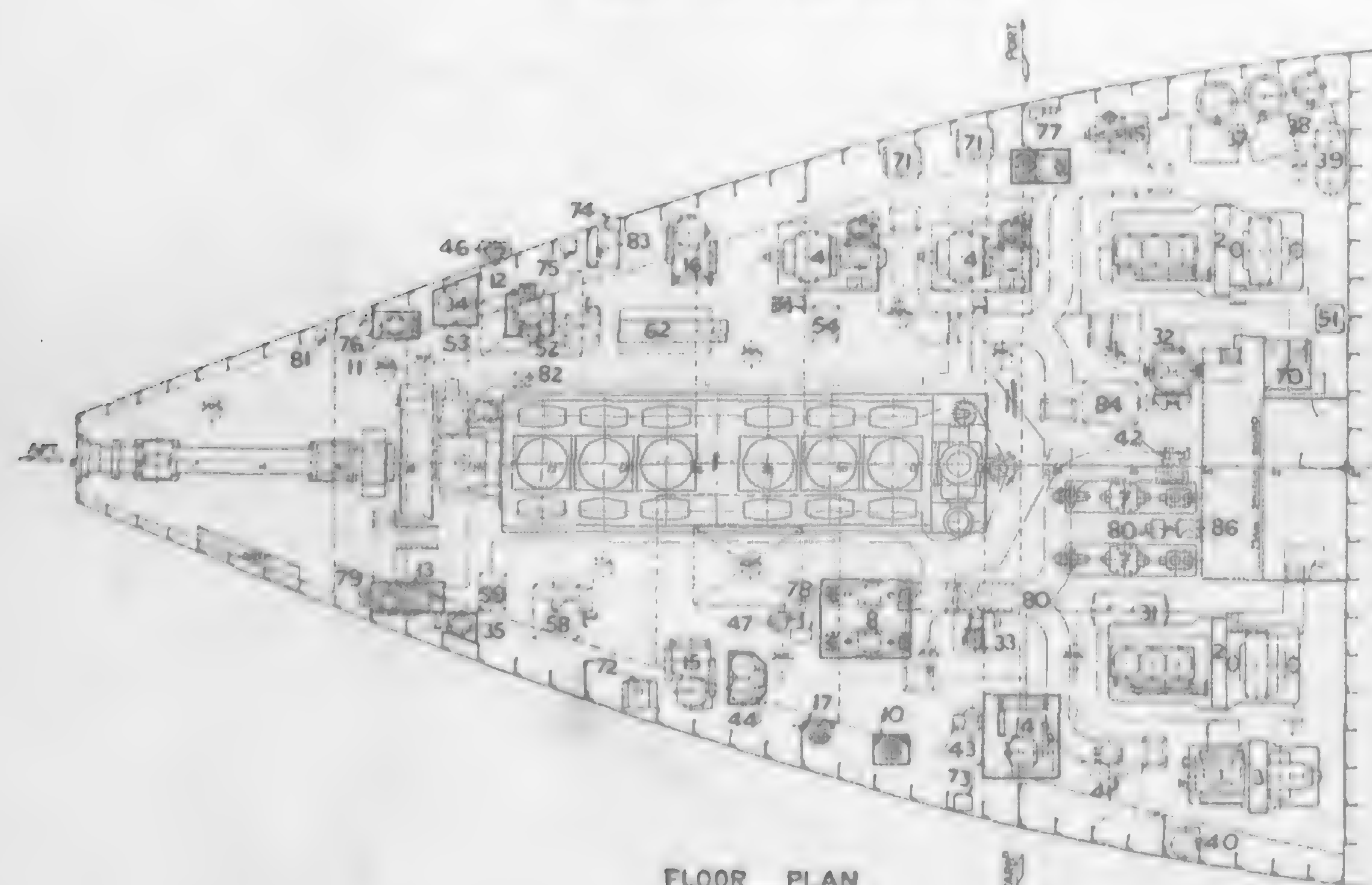
LOOKING PORT FROM SHIP CENTER



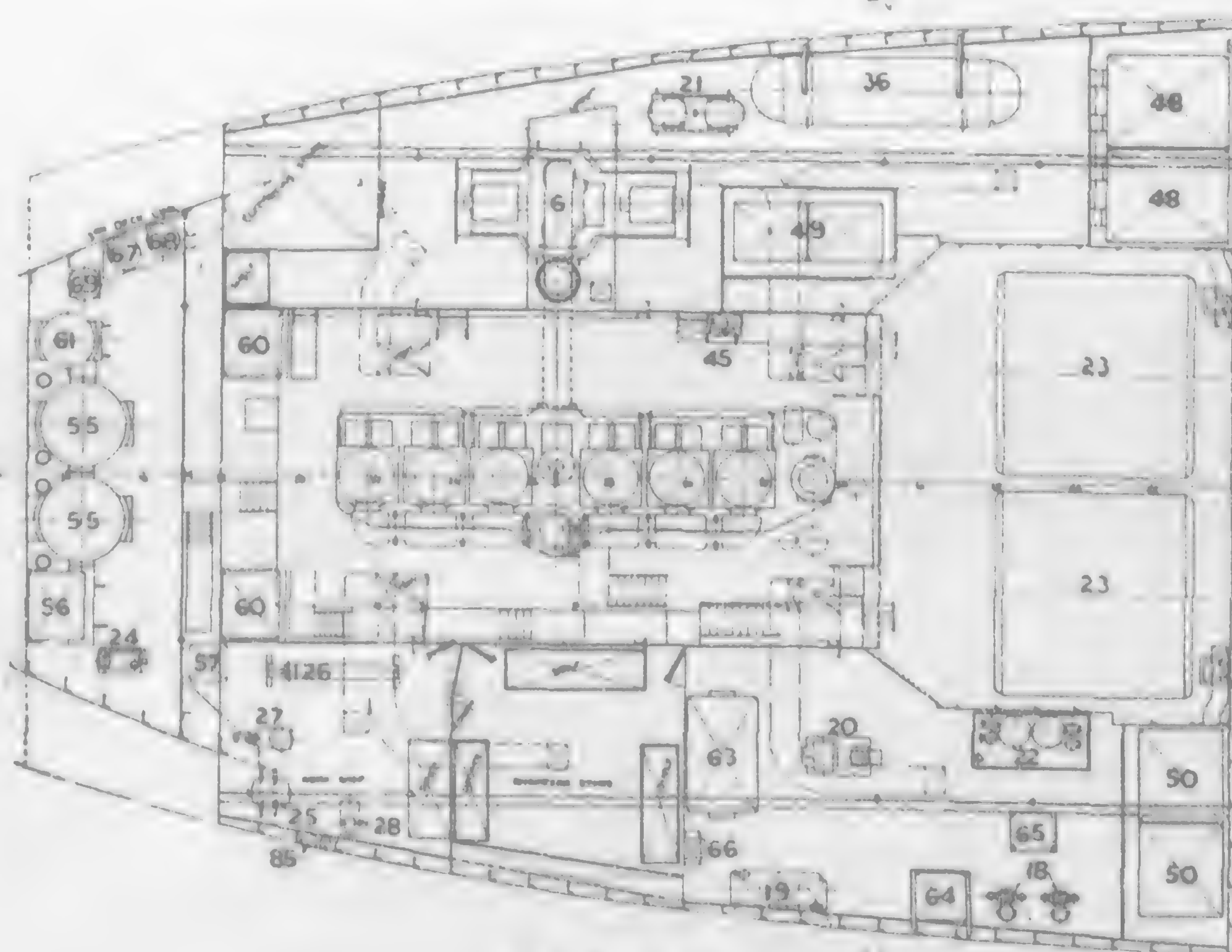
LOOKING FORE FROM F No 35



LOOKING AFT FROM F No 28



FLOOR PLAN



2ND DECK PLAN

MARK	DESCRIPTION
1	MAIN ENGINE
2	MAIN DIESEL DYNAMO ENGINE
3	AUX. DIESEL DYNAMO ENGINE
4	AUX. AIR COMPRESSOR
5	EMERGENCY AIR COMPRESSOR
6	TURBO BLOWER
7	PISTON JACKET COOLING WATER PUMP
8	LUB. OIL PUMP
9	FUEL OIL SHIFTING PUMP
10	FUEL TRANSFER PUMP FOR DONKEY BOILER
11	FUEL OIL SERVICE PUMP
12	FUEL OIL PURIFIER
13	LUB. OIL PURIFIER
14	BALLAST PUMP
15	GENERAL SERVICE PUMP
16	BARGE PUMP
17	FEED WATER INTERMEDIATE PUMP
18	FEED PUMP
19	AUX. CONDENSER
20	STEAM DYNAMO ENGINE
21	HAIR DRYER
22	FUEL OIL BURNING UNIT
23	DONKEY BOILER
24	REFRIGERATING MACHINE
25	WATER SHIP MACHINERY
26	MAIN SILENCER
27	DYNAMO ENGINE SILENCER
28	PISTON COOLING WATER COOLER
29	LUB. OIL COOLER
30	LUB. & FUEL OIL PREHEATER
31	LOW PRESSURE AIR TANK
32	H.P. STARTING AIR BOTTLE
33	STARTING & SERVICE FUEL HIGH AIR BOTTLE
34	STARTING AIR BOTTLE FOR DYNAMO ENGINE
35	STARTER
36	LUB. OIL AIR SEPARATOR
37	FUEL OIL SETTLING TANK
38	FUEL OIL SERVICE TANK
39	MISCELLANEOUS FUEL OIL TANK
40	LUB. OIL RESERVE TANK
41	MISCELLANEOUS LUB. OIL TANK
42	CHAMBER OIL TANK
43	CHAMBER OIL RESERVE TANK
44	CHAMBER COOLING WATER OIL SETTLING TANK
45	SMALL TANK
46	TURBO BLOWER STARTER
47	AUXILIARY COMPRESSOR STARTER



General View of Deck Forward



General View of Deck Aft

It is noteworthy that the vessel was designed in accordance with the new International Freeboard Rules, and a half length of bulwarks is of open rails, whilst the flying passage extending over the whole length of the ship is very strongly constructed, and the poop front bulkhead is substantially compensated.

Main and Auxiliary Machinery

The *Main Engine* is of the Mitsubishi-Sulzer single acting two cycle Diesel type of 6ST60 with a normal output of 2,300 b.h.p. and a 15 per cent overload output of 2,650 b.h.p., at 112 and 118 r.p.m., respectively. The engine has six cylinders of 600 mm. bore and 1,060 mm. stroke. The total length is 12,000 mm., breadth 2,900 mm. and the height from the center of crank shaft to the

top of cylinder covers is 5,338 mm., while the crank radius and diameter of the fly wheel are 405 mm. and 2,100 mm., respectively.

The air compressor is directly connected to the front part of the engine and is of a three stage type, whilst a fuel pump of plunger type is operated through crosshead of the air compressor. The starting air stowage comprises two 2,000 litre-75 atm. reservoirs, one 800 litre-75 atm. reservoir and a low pressure air tank of 5 cub. meters at 32 atms.

The turbo-blower for scavenging air is independently driven by an electric motor and has a maximum capacity of 300 cub. meters per minute. It should not be overlooked that turbo-blowers have been hitherto imported from abroad, but the turbo-blower of this ship was made in Japan and its performance was exceptionally satisfactory.



Shore Connections of Cargo Oil Main



“Maccanking” Steel Hatch Cover

There are two centrifugal cooling water pumps, one for piston, cooling fresh water and the other for jacket-cooling sea water, the capacities being 25 and 100 cub. mtr. per hour, respectively.

Lubricating oil pumps are two in number and of the Naidich type, one for the bearing lubrication and the other for the crosshead lubrication, capacities being 15.5 and 2.5 cub. m. per hour, respectively.

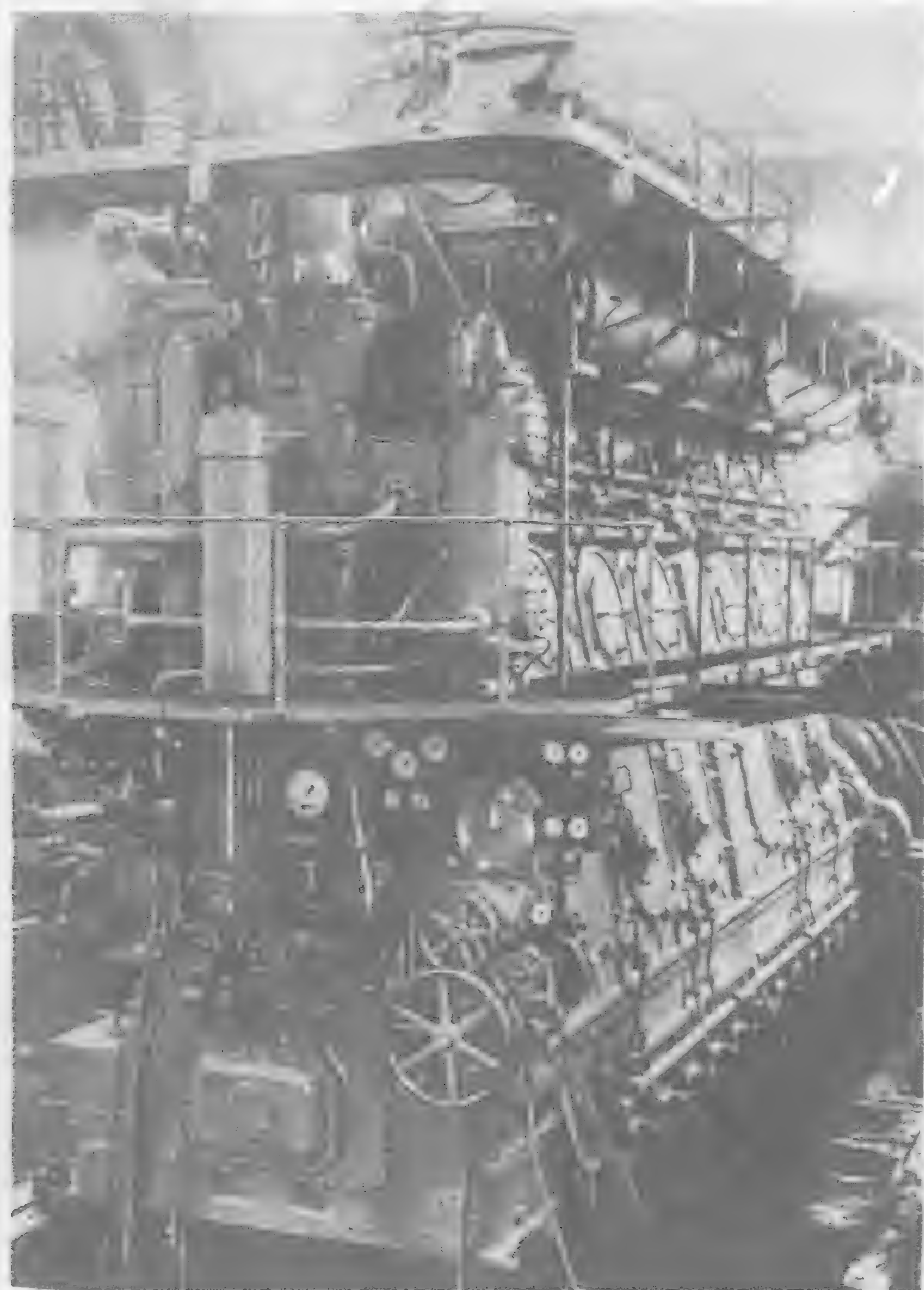
The total weight of the main propelling machinery is as follows:—

The main engine with directly connected pumps	204,900 kgs.
Fly wheel	10,800 ..
Silencer	7,700 ..
Starting air reservoirs	15,100 ..
Independent motors	9,000 ..
Total	248,000 kgs.

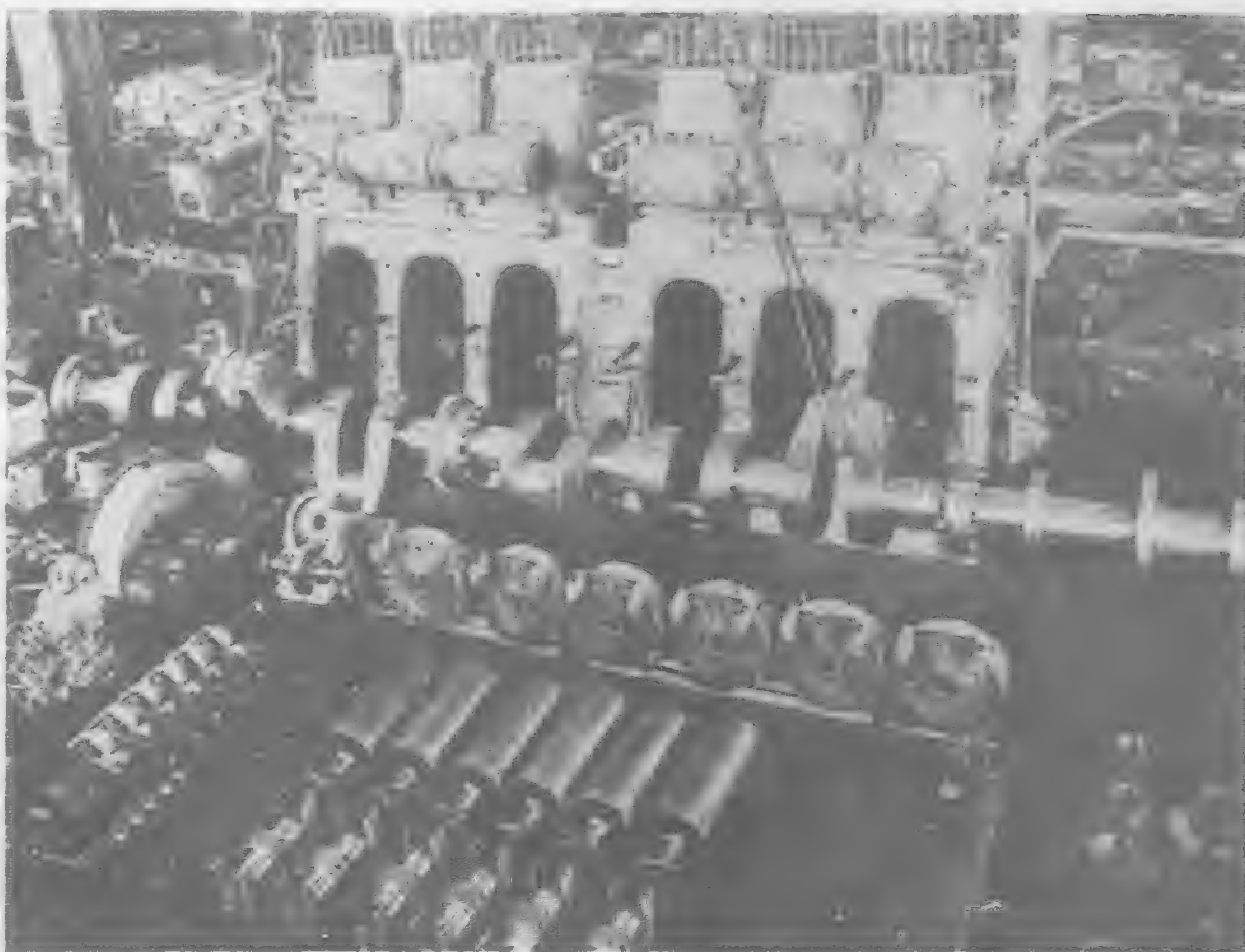
Electric Generating Sets.—The main generating set comprises two 135 kw.-225 volt dynamos driven by Mitsubishi four-cycle airless injection Diesel engines, while the auxiliary set is one 30 kw.-225 volt dynamo driven by a Diesel engine of the same type. There is also a steam driven dynamo of 10 kw. capacity. All electric machinery was supplied by the Mitsubishi Electric Engineering Co., Ltd.

Steam Generating Plant

This comprises two single ended marine Scotch boilers with a diameter 12-ft., length 11-ft. 6-in. and a working pressure at



Main Engine on Test Bed



"Ogura Maru's" Main Engine being Assembled. It is of the Mitsubishi-Sulzer Single Acting Two Cycle Diesel Type with Normal Output of 2,300 b.h.p. and 15 per cent Overload Output of 2,650 b.h.p. at 112 and 118 r.p.m.

150 lb. per sq. in., these supply steam to winches, windlass, galleys, baths and for the heating of the ship and cargo oil heating, etc. All necessary accessories such as two feed pumps, a condenser, a complete oil burning set, etc., are provided.

Various Auxiliaries

Apart of the forementioned auxiliaries, the following electric driven machinery is installed in the engine room:—

- Two—Mitsubishi-Sulzer C60 Type three stage auxiliary air compressors driven by a 75 h.p. motor.
- One—Emergency air compressor driven by a hot-bulb heavy oil engine.
- One—Fuel oil transfer pump of spar wheel type, capacity 15 tons per hr.
- One—Fuel oil service pump of the same type, 1.5 tons per hr.
- One—Bilge pump of plunger type, 50 tons per hour.
- One—Bilge and ballast pump of the same type, 75 tons per hr.
- One—General service pump of the same type, 50 tons per hr.
- One—Lubricating oil purifier of the Westfaria type, 300 gals. per hr.
- One—Fuel oil purifier of Vicken type, 480 gals. per hour.

Differences from Main Engine of First Ship

In comparison with the *Ogura Maru No. 1* built in the Nagasaki Shipyard in 1929.

(a) The injection air compressor direct coupled to the main engine is two in number and of a three stage single acting type in the first ship, whilst in the present ship only one set of three stage compressor with double acting L.P. cylinder is provided, so that the length of the engine and the weight have been considerably reduced.

(b) The crank shaft of the first ship was imported and is of a solid type, while that of the second ship is of a semi-built up type made by the Nagasaki Works.

Cargo Oil Handling Arrangement

For the loading and unloading of cargo oil, one main suction pipe of 10-in. bore is fitted on each side of the longitudinal center line bulkhead; each side pipe having two 8-in. suction fittings to each compartment, one for one side tank and the other carried through the longitudinal bulkhead for the other side tank. There are two 10-in. bore direct loading lines from deck into the main suction lines at the after side of the pump house and provided with a cross-over pipe.

Also one 6-in. bore main suction line for refined oil is arranged on each side of the center line bulkhead in No. 1 tank, connected to a refined oil pump. There is a separate refined oil loading line from deck and connections to the cargo oil main line, etc.

An 8-in. stern loading and discharging pipe is led from the aft end of the poop deck and is carried to the port side, and connected to the main cross-over pipe, which is provided with four hose davits. A 5-in. transfer line is fitted from a pump in the forward pump room to deliver oil from the forward peak tank to the aftward engine fuel oil tanks.

As mentioned before, there is a main pump room near amidships and a forward pump room at port side in the general cargo hold. In the former room are two sets of heavy cargo oil pumps, each of a capacity of 300 tons per hour at 100 lb. of steam pressure and one set of 100 ton light oil pump, while in the latter room one set of 60 ton fuel oil transfer pump and one set of bilge and ballast pump are installed. All pumps are of the horizontal duplex double acting type supplied by Dowson & Downie Co.

All cargo oil tanks and bunkers except the summer tanks are fitted with 2-in. steam pipe coils of an ample surface for the heating of cargo oil. Steam taken from the deck steam line is led along under the gangway and to valve nest on the deck and then is carried down to the heater coils, a similar arrangement being adopted for the exhaust.

There is no special apparatus for the measurement of oil quantities in the tanks, but hinged ullage plugs of 10-in. diameter secured by butterfly nuts are provided to each oil tank as well as summer tank hatch cover.

Fire Extinguishing and Gas Freeing Appliances

Permanent steaming out and fire extinguishing pipes are fitted to each oil compartment.

As to the freeing of gas, all cargo oil tanks and cofferdams are fitted with a 3-in. pipe to take a korting ejector. There are six portable korting ejectors provided for all tanks, and two permanent korting ejectors fitted in the main pump room, each being of a capacity of 100 cub. ft. per minute at 100 lb. steam pressure.

Further, hatches of all main oil tanks and summer tanks are fitted with 3-in. vapor pipes with valves, these pipes being led into 4½-in. piping under the fore and aft gangways and led up to the masts for a height of 30-ft. "Y" pieces on top of each pipe along the masts are fitted with one "Trios" valves on each branch. These valves are spring loaded combined pressure and vacuum valves, the pressure valves being relieved at 3-in. water pressure, whilst the vacuum valves at 1-in. water pressure.

Miscellaneous Appliances

The steering gear is of the William Janney-Brown electric hydraulic type with two rams and an emergency hand gear supplied by Brown Brothers & Co. of Edinburgh, the pumps being driven by a 20 h.p. electric motor. The telemotor system of control is adopted.

The windlass is steam driven horizontal type with cylinders of 240 mm. by 300 mm., supplied by the Atlas Werke of Bremen.

There are three efficient cargo winches on the upper deck, two for the fore mast and one for the main mast, beside one mooring winch on the poop deck aft. All are steam driven and were supplied by Japanese makers.

There is a refrigerating machine on the third deck platform of the engine room for the use of provision stores. This is a motor driven ammonia compression type of 6,000 B.T.U. per hour, supplied by the York Ice Machinery Corporation of the United States.

Two 28-ft. life-boats are provided on the engine casing house top and one Japanese junk ("Temma") on the navigation bridge deck.

All necessary navigation appliances including wireless telegraphy and telephony apparatus, a direction finder, a sounding machine, etc., are completely provided.

Officers' and Crew's Accommodation

For the officers' accommodation, a dining-saloon and pantry and deck officer's cabins are arranged on the bridge deck, and a captain's room, wireless telegraphy and operators' rooms on the navigation bridge deck, whilst on the poop deck are engineer's cabins and a galley, and under the poop deck are an engineers' mess-room, petty officer's cabins, crew's cabins, sailors' and oilers' mess-room, etc. Special precaution has been taken for the ventilation, lighting and heating of these rooms.

It is noteworthy that the officers' dining-saloon was designed under the special consideration for the comfort and is elegantly decorated, unequalled to any of this type of vessels.

This room is situated on the middle of the bridge deck with four special front windows, a long table for 10 persons and a beautiful sideboard. The decoration follows the Adam's style, with silk tapestry curtains of rose color, green moquette chair linings and gray table cloth, whilst the ceiling is of dull gray flat paint finish, the floor is covered with raboleum of colored diamond pattern and the walls are panelled with polished white beech with mahogany frames.

Trial Results

Various trials were carried out on January, 1931, off Miye near the entrance of the Nagasaki Harbor; the results were very satisfactory.

The summary of the trial results is given below:—

SHIP No. 487 "OGURA MARU No. 2" SUMMARY OF

SEA TRIAL RESULTS.

Place	Off Miye, Nagasaki			Jan. 31, 1931
Date of Trial	Jan. 28, 1931		Official T.
Kind of Trial	Preliminary Trial		
Draught F.	5'-6½"		5'-6½"
A.	16'-4½"		16'-4½"
M.	10'-11½"		10'-11½"
Trim by stern	10'-10½"		10'-10"
Displacement in Tons	5,375		5,368.5
Weather	Over Cast Cloudy		Fine
Condition of Sea	Very Smooth	Smooth	Smooth
Direction and force of wind	S.E. O—1	W—2	N.E. 1—2
Kind of Load	4/4	3/4	2/4
Ship Speed in Knots	13.581	12.696	11.299
Slip per cent.	—3.7	—6.3	—5.5
Engine r.p.m.	119.9	111.0	98.7
Mean Ind. Press K9/CM ²	6.00	5.12	4.16
I. H. P.	2,874	2,269	1,638
B. H. P.	2,302	1,772	1,232
Fuel Consumpn. Gr/B.H.P./hr.	171.8	—	—
Main for Engine Gr/I.H.P./hr.	137.4	—	—
Pressure Kg/CM ²			
Scaveng. Air	0.105	0.100	0.090
Injection Air	71.5	64.0	54.5
Lubricatg. Oil			
Bearing	0.91	0.91	1.15
Crosshead	20.0	19.5	20.0
Cooling Water			
Piston (Fresh Water)	2.88	2.86	2.90
Cylinder (Sea Water)	1.50	1.50	1.50
Exhaust Gas			
Pressure mm. W.G.	190	183	160
Tempertr. C°	239	196	158
Temperature C°			
Piston Cooling			
Inlet	36.8	41.8	44.8
Outlet	48.0	53.3	54.3
Jacket Cooling			
Inlet	19.0	18.0	18.5
Outlet	41.5	39.0	34.3
Room	15.3	15.8	16.7

N.B. Fuel oil used during Trial:—Tarakan Oil, Net Calorific Value, 10,327 Cal./Kg.

New Inter-Island Steamship Service

MESSRS. L. EVERETT, Incorporated, General Agents in the Orient for the U. S. Shipping Board's services the American Pioneer Line and American Gulf Orient Line for whom the Roosevelt Steamship Company and Tampa Inter-Ocean Steamship Company are Managing Operators, commenced inter-island services in the Philippine Islands in July, 1929, when the *S.S. Kinau* was purchased from the Inter-Island Steamship Company of Honolulu by the Philippine Steam Navigation Co., Inc. The vessel's itinerary was to call at Manila, the metropolis of the Islands, Cebu the chief city of the Island bearing that name, Dumaguete the leading port of the province of Oriental Negros, Zamboanga the first port of the Island of Mindanao, as well as Cotabato, also on Mindanao, and Jolo on the picturesque Island of Jolo where the Moro of to-day thrives in the same fashion as in the days of his forebears. From the commencement the 12-day schedule was a success and so much so in fact that the La Naviera Filipina, Inc., appointed Messrs. L. Everett, Inc. general agents for their new motor ship the *M.V. Rizal* built in Hongkong especially for this trade and to maintain with the *Kinau* a weekly service. Following the *Rizal*, L. Everett, Inc. were appointed agents for the *M.V. Kolambugan*, a lumber carrier, calling at lumber ports only. Next came the *Florence D.* making the ports of Manila, Legaspi, Lamit Bay and Tabaco, and then came the *Salvager* and *Atlantic Gulf* calling at Manila, Zamboanga, Iloilo, Davao and lumber ports.

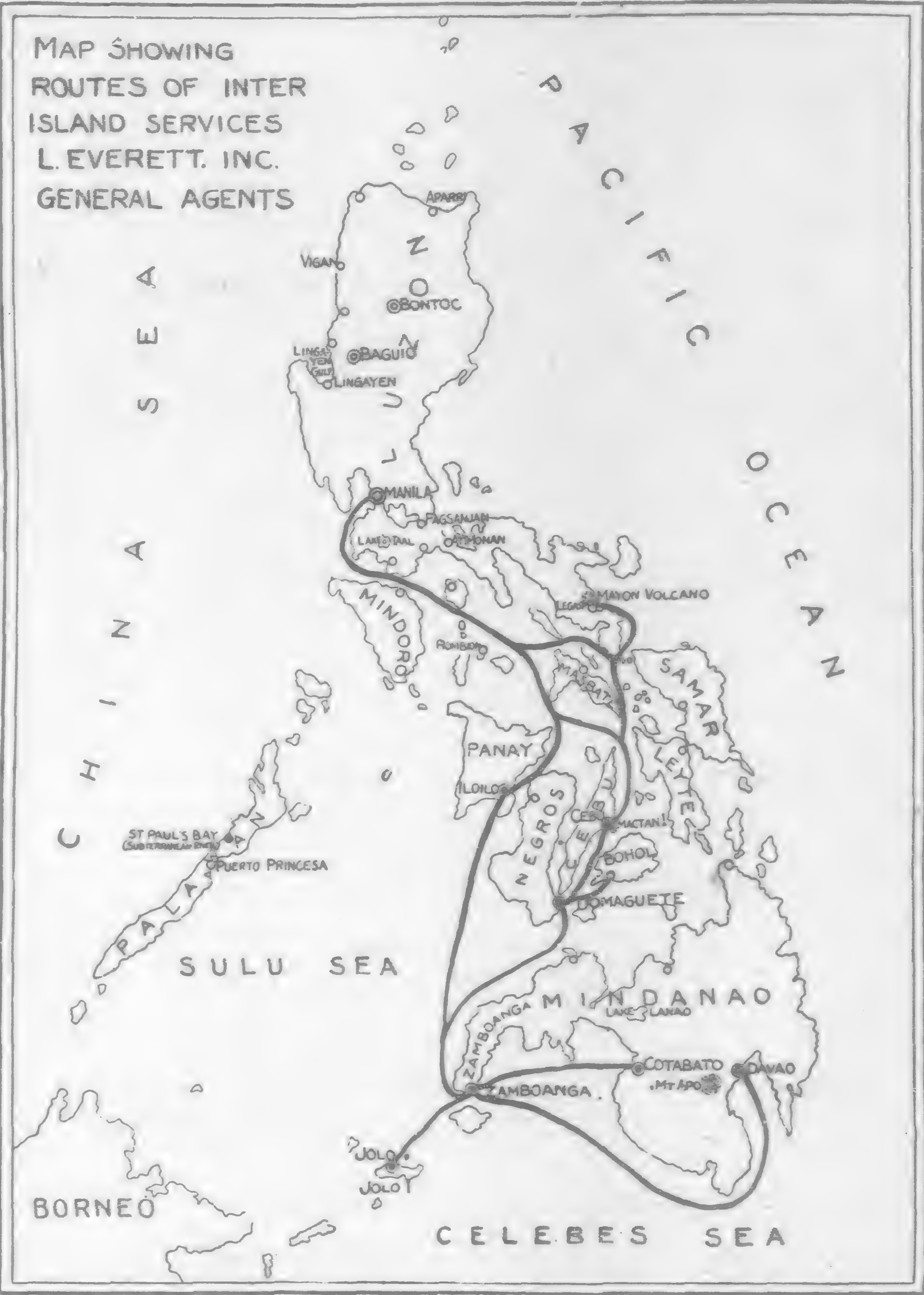
In August, this year, another vessel was added to their list when L. Everett, Inc. were made agents for the *M.V. Bohol* operating on a six day round trip schedule from Manila to New Washington via Mangarin, Ibahay, Capiz and Romblon.

All the vessels are passenger and freight carriers—the *Kinau* accommodating 91 first and third class passengers, the *Rizal* 132 first and third class passengers, the *Kolambugan* 59, the *Florence D.*, the *Salvager* and the *Atlantic Gulf* each carries 110 first and third class passengers, and the *Bohol* eighty.

The objective aimed at by L. Everett, Inc. has been to accept agencies only where they would add vessels to the well balanced schedule they have for their other sailings. The company's ambitious program which has been practically accomplished is to have sailings to all the major ports in the Islands. At the same time the company has constantly been the leading exponent of the formation of an inter-island Conference which would stabilize rates and create a common medium for the expression of the views of

the large number of small and large shipowners operating inter-island.

The successful entry of the American Steamship Company into the inter-island trade has demonstrated the ability of the firm to successfully employ on a paying basis, tonnage in a badly depressed trade and, rumours are to the effect that Messrs. L. Everett, Inc. will shortly acquire further Philippine tonnage to round their program.



Japan Tea for Soviets

The Department of Agriculture and Forestry of Japan and the Department of Finance are expected to give favorable consideration to the plea of the Japan Tea Association which asked the Government to give financial aid in some form to those who are connected with tea exports to Soviet Russia, according to a special Tokyo dispatch to the *New York Journal of Commerce*.

The tea merchants claim that if appropriate financing is given exporters a notable expansion would be made within a short period in the tea exports to U.S.S.R., which have already shown remarkable growth in the last few years despite the inconvenience caused by the nine-month credit term that has been in practice in the trade with that country.

The development of tea trade with Soviet Russia is conspicuously indicated by the following figures :

						Volume in Pounds	Index No.
1925	...	...	...	...	...	337,262	100
1926	...	...	...	...	...	401,864	119
1927	...	...	...	...	...	1,006,200	298
1928	...	...	...	...	...	1,431,851	424
1929	...	...	...	...	...	3,312,385	982
1930	...	...	...	...	...	6,154,785	1,633

The above figures show that the tea trade has grown sixteen-fold within the past six years. The value of trade for the year 1930 totaled Y.2,434,800.



The "Robert Coryndon" on Lake Albert

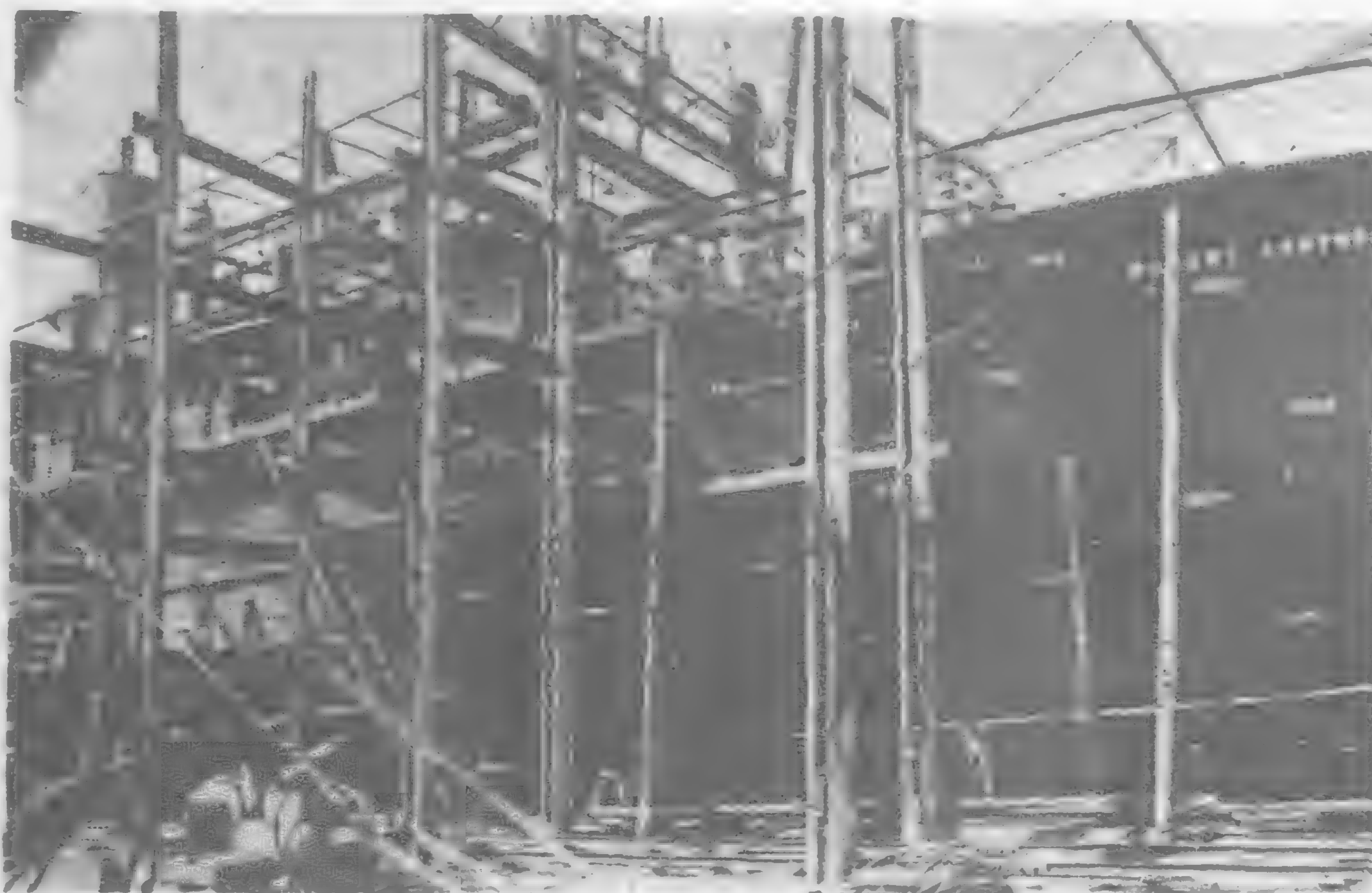
Thornycroft Steamship Carried 700 Miles Overland in Africa

British Shipbuilders Complete Unique Project Placing Craft of 300 Tons on Lake Albert

LAKE ALBERT is one of the chain of great lakes which extend through Central Africa. It lies almost under the Equator where the British Empire territories of the Sudan, Uganda and East Africa meet, 700 miles in a direct line from the coastline of the latter bordering the Indian ocean.

This remote spot of the British Empire has great trading possibilities which, however, have been hitherto handicapped by lack of water transport.

Now it will be able to look forward to greater development as a result of remarkably successful work recently accomplished by the well-known firm



Vessel Under Construction at Thornycroft Works at Southampton
Showing Component Parts Marked for Weight and Size

of British shipbuilders, Messrs. John I. Thornycroft & Co., Limited.

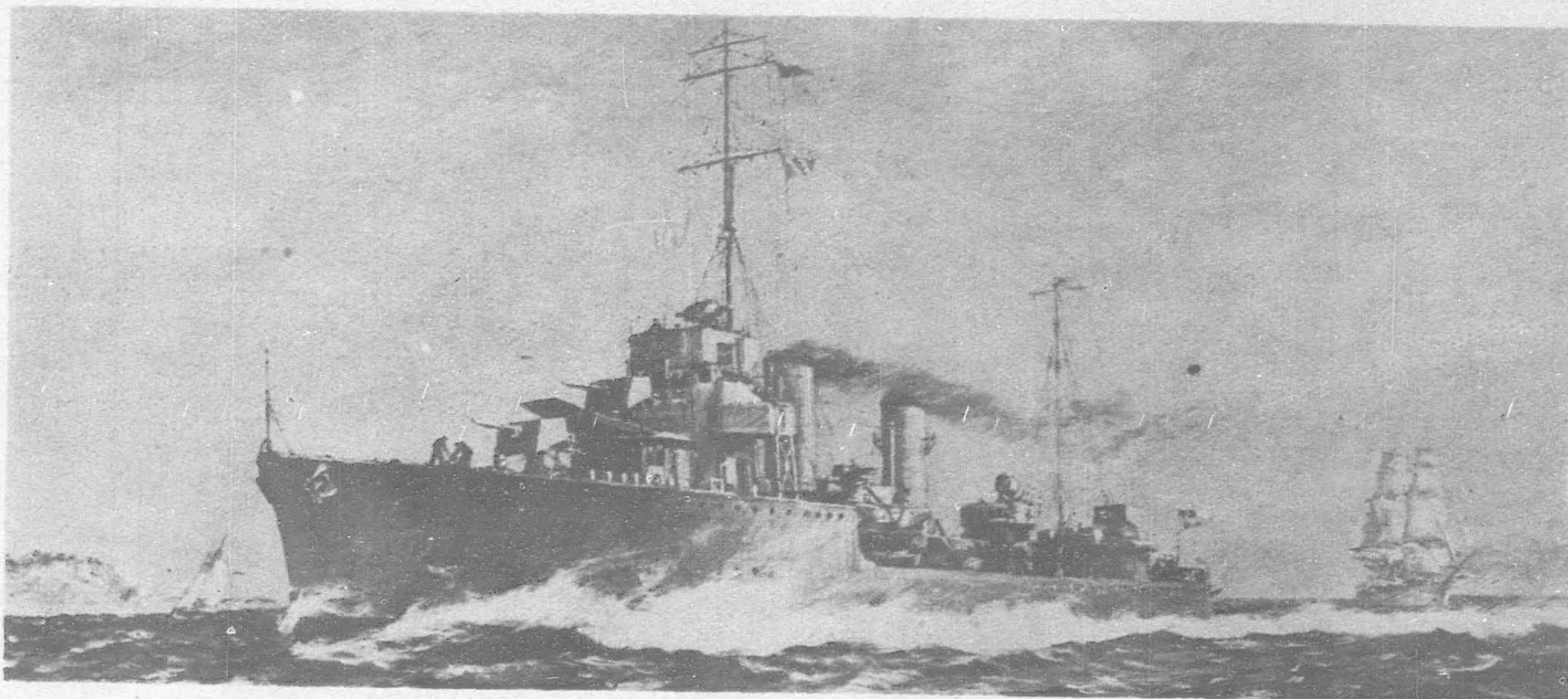
They were approached by the Crown Agents for the Colonies, who manage all the business affairs in London for the smaller autonomous parts of the British Empire, and invited to design and build a suitable type of boat for service on Lake Albert.

It was easy enough to build the boat in sections for re-erection overseas, but the big problem to be faced was the fact that every component part had to be transported overland for the 700 miles from the Kenya Coast to Lake Albert, some of
(Continued on page 718)

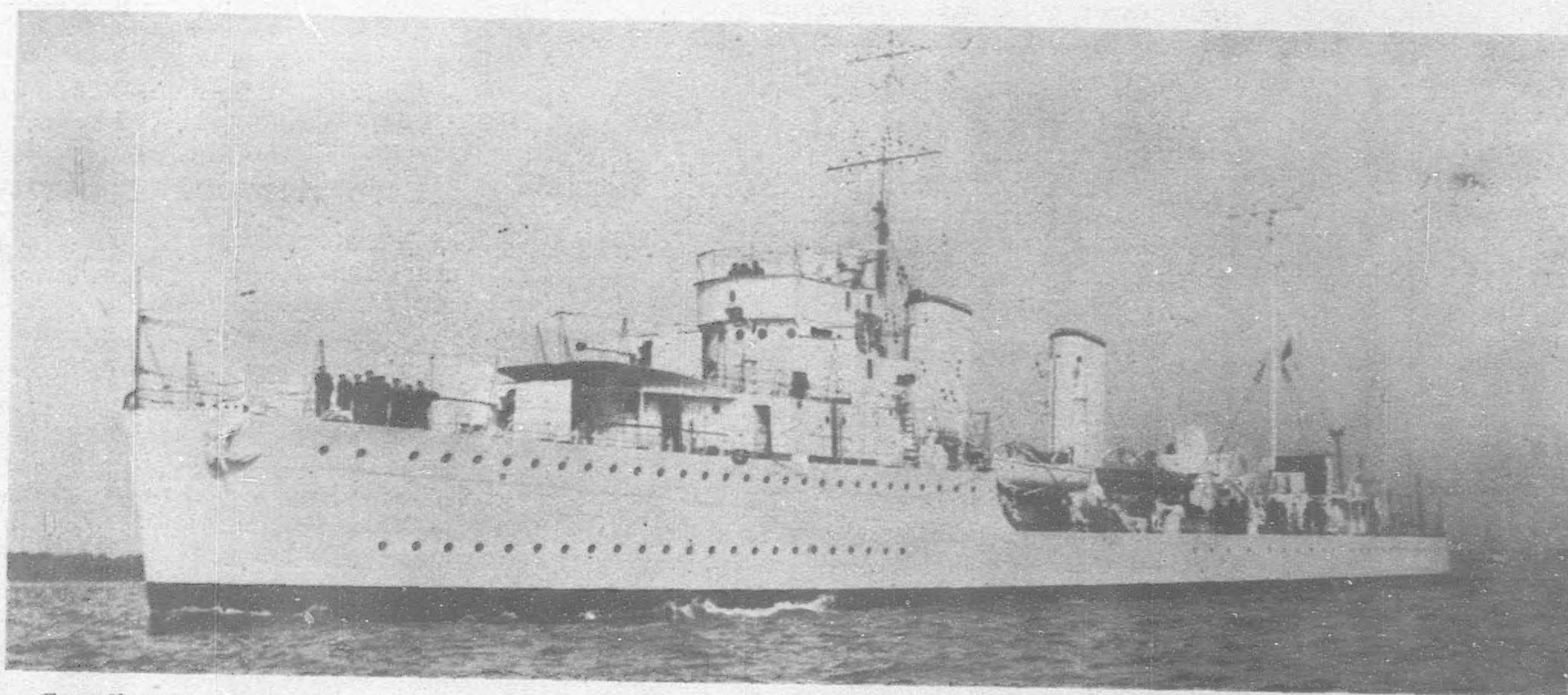


Above Pictures Show Arrival of Boat in Sections at Butiaba on Shore of Lake Albert and Erection and Completion of the Craft There

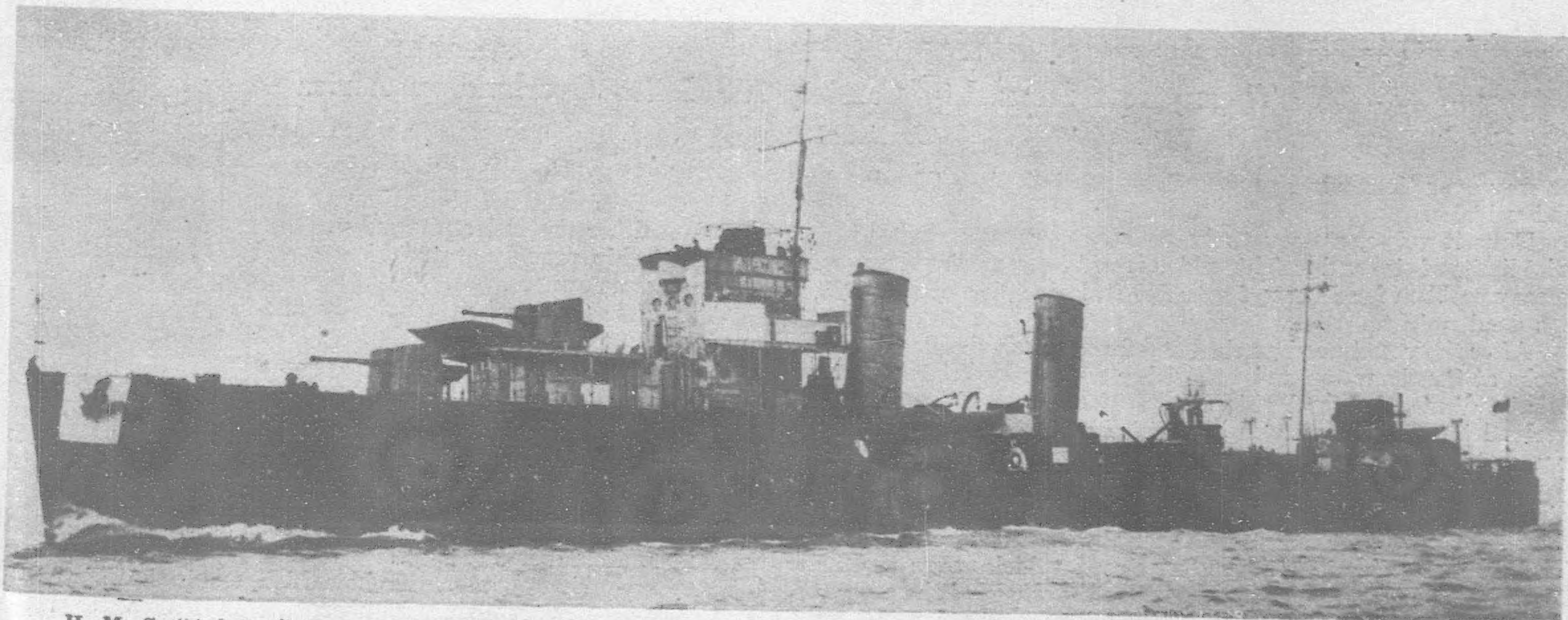
WARCRAFT CONSTRUCTION BY THORNYCROFT



Chilian Torpedo Boat Destroyer "Serrano," one of Six Warcraft Built by Messrs. John I. Thornycroft & Co. for Chile. Craft is Shown Running into Valpariso



Canadian Torpedo Boat Destroyer "Saguenay," one of Two Warcraft Built for Canadian Government by Messrs. John I. Thornycroft & Co. in 1931



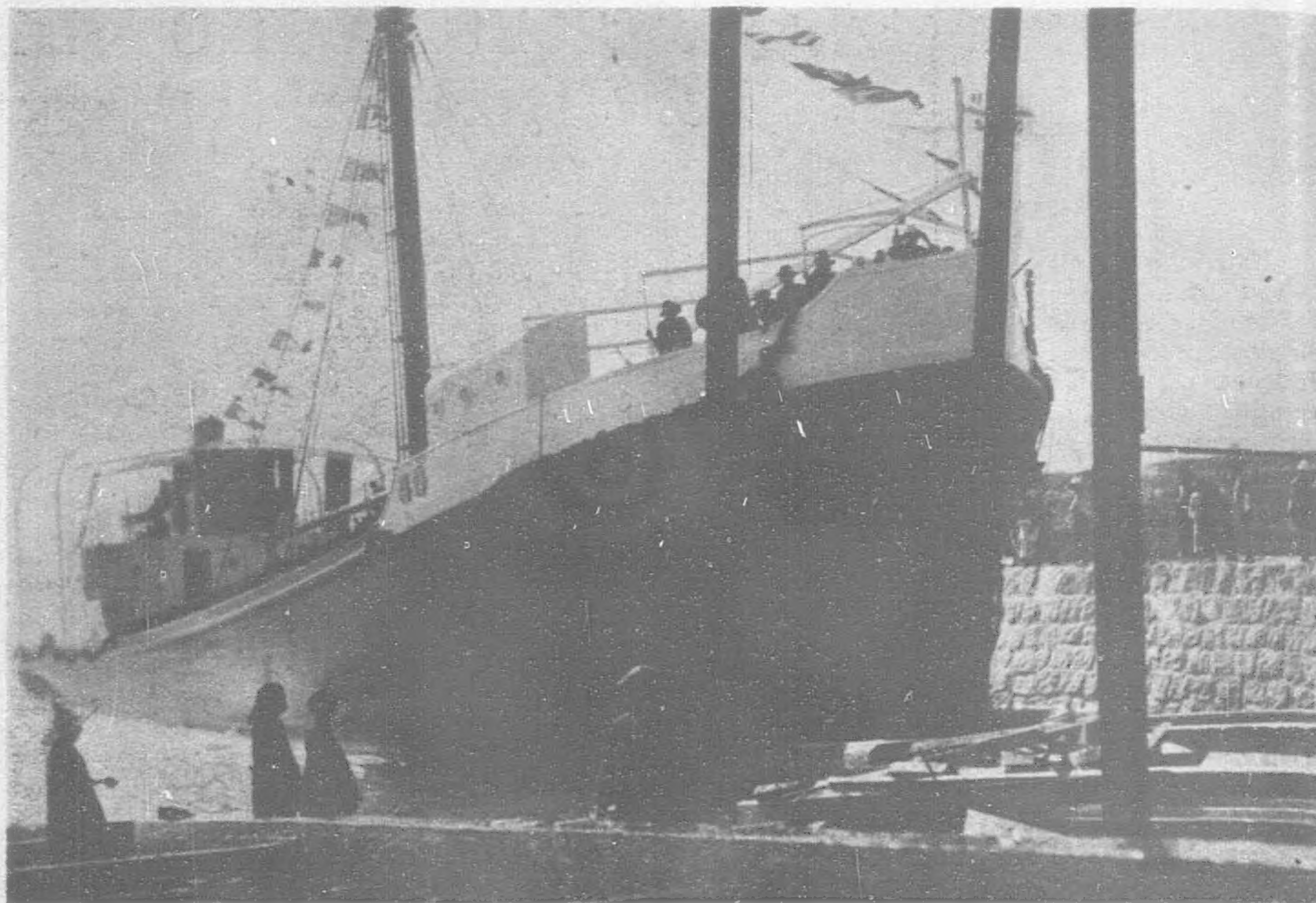
H. M. S. "Acheron" Latest and 72nd Torpedo Boat Destroyer Built for the British Navy by Messrs. John I. Thornycroft & Co.

Sister Motorships go into Service

Two new sister motorships that are being put into service between Hongkong and Wuchow are the *Hoi Fook* and the *Hoi Kong*, which were launched on October 27 at the shipyard of the South China Motor Shipbuilding and Repairing Works, Ltd., at To Kwa Wan. This first double launching in the annals of the shipyard was directed by Captain G. Brandt of Messrs. Brandt & Co., who are General Managers for both the South China Motor Shipbuilding & Repairing Works and for the Hai Fook Shipping Company, Ltd., for whom the vessels were built.

The two boats are of the same design, and are intended for cargo carrying and are also equipped for towing purposes. They are of steel, twin screw type, each equipped with two two-stroke high compression Diesel engines, and capable of an approximate speed of eight to nine knots.

Special Mannesman steel tubular derricks are fitted for loading purposes, one having a 10 ton lift and the other a two ton lift. The windlasses are driven by Deutz engines through chain gearing, and both vessels are lighted throughout by electricity. Crew space for twenty men



The "Hai Fook" Leaving the Ways

is provided, and special large hatches have been made to facilitate the loading of bulky cargo.

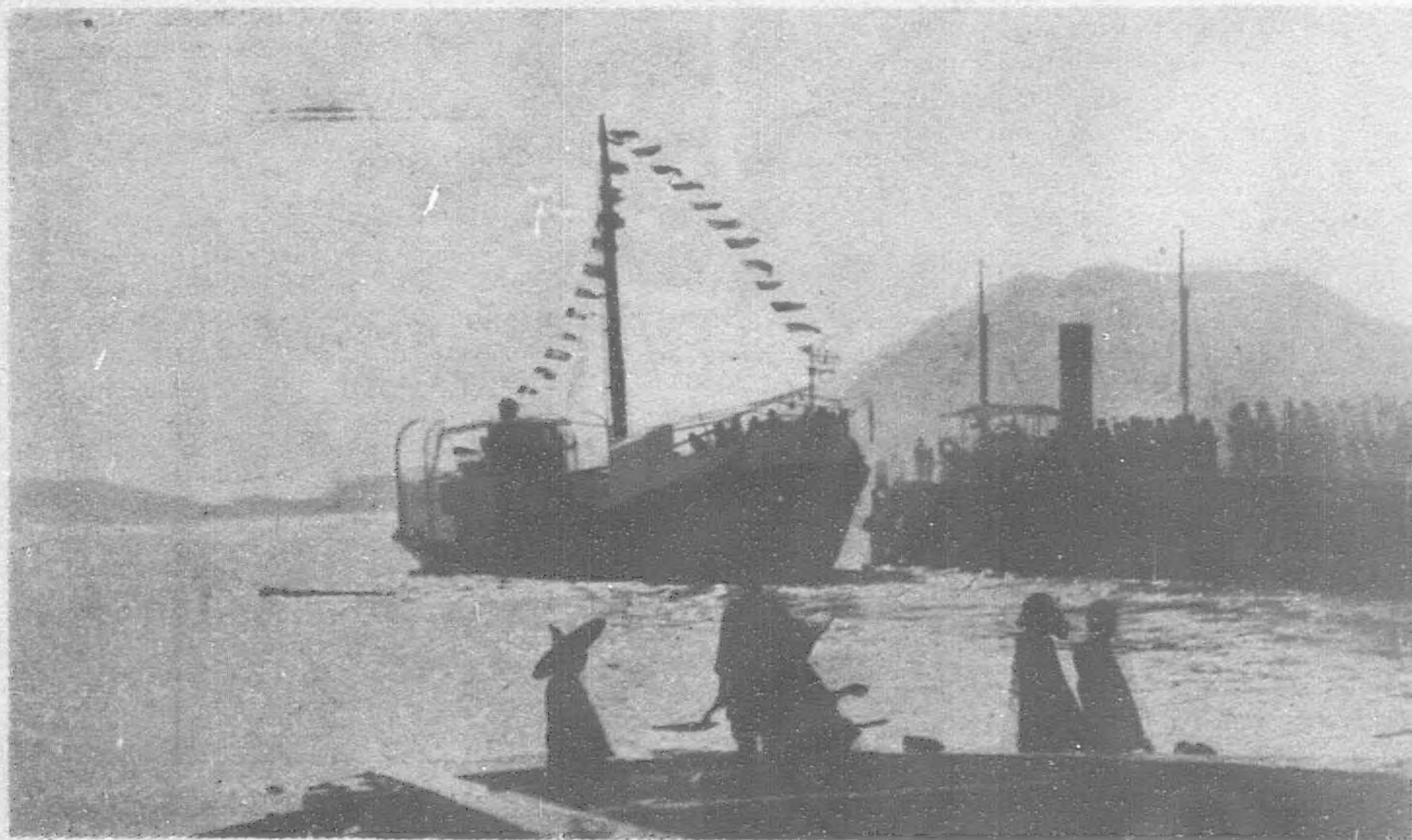
The dimensions of each boat is :—Length overall, 135-ft. 3-in.; beam, 25-ft. 7-in.; and draught, 7-ft. 3-in. with a load of 300 tons.

Three New Motor Ferries

Also recently launched from the yard of the South China Motor Shipbuilding and Repairing Works, Ltd., were three new motor ferry boats, the *Ming Chu*, the *Yu Chu* and the *San Chu*. It is said that these craft mark a departure and an improvement for the conveyance of passengers in southern local waters.

These three motor ferries have dimensions of 45-ft. by 9-ft. by 4-ft. with draft of 2-ft. 7-in. and are equipped with 25 b.h.p. Deutz 3-cylinder Diesel engines and Bosch electric lighting sets. Originally these craft were designed for service in the harbor at Canton, but for the present they are being held at Hongkong and probably will be employed in Hongkong harbor.

In a series of trial runs the three new motor ferries gave every satisfaction, attaining a speed of 8.3 knots per hour.



New Vessel in Stream

Thornycroft Steamship Carried 700 Miles Overland in Africa

(Continued from page 716).

the way over the narrow gauge railway, and the last 75 miles by road vehicles.

Thus it was necessary to keep each component part within strict limits of size and weight, which it will be appreciated was not an easy problem for a boat of over 200-ft. in length and nearly 300 tons dead weight.

After the vessel was launched and fitted out at the Thornycroft Works at Southampton and passed her acceptance trials, she was entirely dismantled and shipped to Mombasa. Here the long overland journey commenced comprising some hundreds of crated or uncrated parts, for no single one of these could exceed a limit of 4½ tons in weight or 30-ft. by 9-ft. 6-in. dimensions, to allow of being transported over the Kenya and Uganda metre gauge railway, which successfully took them to its terminus at Namasagali. Here the even more hazardous journey by road vehicles over the final 75 miles was commenced but eventually the whole of the separate parts were dumped at Butiaba on the Lake shore where, Messrs. Thornycroft's technical staff set to work with the help of gangs of natives to build the ship anew.

Within three months the boat was again launched by Mrs. Jenkins, wife of the Chief of the Kenya and Uganda Railway Marine who named her the *Robert Coryndon*. Six months later the fully completed ship proudly steamed her trials before final acceptance by her present owners.

The *Robert Coryndon* is actually 207-ft. in length, 32-ft. in breadth, 950 tons d.w. with a draft of slightly over 7-ft., carrying approximately 280 tons of cargo. In addition she has comfortable accommodation for over 20 passengers and the crew.

Shortly after commencing her regular service, Messrs. John I. Thornycroft & Co., Limited received a most gratifying letter from the owners expressing their congratulations to everyone concerned in the difficult task they had so successfully accomplished of providing this vessel, which is now proving such a great acquisition to the traders around Lake Albert.

Accompanying photographs show this vessel in the Thornycroft Works with each part plainly numbered, prior to dismantling, also at various stages of re-erection and as completed during her first run on Lake Albert.

Engineering Notes

INDUSTRIAL

BOXER FUNDS FOR MILLS.—Having received official approval of the Nanking Central Political Council concerning its proposals for the employment of surplus funds of the British Boxer Indemnity Refund as security for the purchase of spindles and other textile machinery on long-term credit basis, the Ministry of Industry is now consulting various Chinese cotton mills in Shanghai regarding such purchases and other related matters.

SOVIET SILK INDUSTRY.—Like all the other light industries, the silk industry in the USSR has long exceeded its pre-war standards. The cocoon crop has been doubled. The Soviet filatures employ already more than 25,000 workers. There are 115 new big mulberry hothouses producing annually about one million trees. Already more than 100 State mulberry plantations have been organized and more are in the process of development. At the same time a large number of silk worm breeding collective farms have also been created. The silk industry is no longer confined to the East of the USSR, but is rapidly developing in the Ukraine, Northern Caucasus and Crimea. The industry is being mechanized. Soviet engineers having designed mulberry drills, feeding conveyors, automatic machines for cooking the cocoons and other special machines. A number of prominent Japanese silk specialists have been invited to the USSR to work in the Soviet silk industry.

TEA GROWING IN THE USSR.—Serious attention is given to the cultivation of tea in the USSR. The area of tea plantations amounted on July 1, of the current year to 22,142 hectares, while in 1930 14,269 hectares were under cultivation and in 1929 only 7,813 hectares.

The Soviet Government requested the People's Commissariat for Agriculture and the Central Tea Corporation "Chaigrusia" to pay special attention to the increase in the yield of tea cultures which should reach at the end of the present Five-Year Plan not less than three tons of green leaves and one ton of seeds per hectare.

JAPANESE IRON PIPES.—The 10,000 tons of iron pipes for water mains supplied to the Japanese Government by the Kubota Iron Works, through a Dutch firm, toward the end of last year, has apparently proved satisfactory to all concerned, for an order has been placed by the Johore Government in the Straits Settlements, with the Mitsubishi for the supply of 5,000 tons of similar kind of iron pipes. The Mitsubishis are now sounding the Kubota Iron Works as to the quotation, and in all probability, the order will be accepted. Judging by the market price of pig-iron which is the material for the iron pipes, which is quoted at Y.27 per ton in Japan while it is quoted at Y.41 in America, the Mitsubishis are considering the possibility of exporting iron pipes to America, and are said to be investigating the situation of demand for iron pipes on the Pacific Coast.

JAPANESE ALUMINIUM.—Financial aid of the Government for the organization of the Nippon Aluminium Industrial Company is being sought by Mr. Suekichi Nakagawa, president of the Furukawa Electric Industrial Company. The plan of the Nippon Aluminium Company, as revealed by Mr. Nakagawa, aims at the annual production of 4,000 tons of aluminium for the first year and 12,000 tons by the sixth year, relying on importation from South Seas for the essential material. The proposed company will be capitalized at Y.30,000,000 should it be equipped with a electric power generating plant of its own, while the capitalization will be about Y.12,000,000 if the power is supplied by others. It is reported that the president of the Furukawa Electric concern asked the Government to give a subsidy of Y.5,000,000 for the project.

PLAN MACHINE WORKS.—Under instructions from the National Government the Ministry of Industry is planning the establishment of a Central Machine Works in Nanking in order to facilitate industries and in compliance with the constructive plan devised by the late Party leader. Representing the Ministry, Mr. Chen Chien-chun is in Shanghai to negotiate with local British engineering firms for the supply of the necessary machines.

The location of the works will be in Hsiakwan, Nanking, with a capital of \$3,000,000 taken from the British share of the Boxer indemnity. Of the amount, \$2,500,000 will be appropriated for the purchase of British machinery; the balance for circulating capital, the construction of plants and necessary other buildings.

The activities of the Works will be limited to the manufacture of steam boilers, cold storage machines, engines for architectural and other industrial purposes.

SELLING SULPHATE IN CHINA.—In many districts in South China one will pass through a village where nothing but pure white Billingham ammonium sulphate is sold, while five miles further on the farmers, growing exactly the same type of crop, will not look at a white product, but demand, and are prepared to pay more for, say, a particular purplish type (originating probably in some obscure English gasworks), which they state produces far better results than any other colour, including even the far purer sulphate of Billingham fame. Yet another five miles and the purplish product will quite fail to attract the customer, and it is a yellowish brown sulphate which alone will satisfy their requirements.—*I.C.I. Magazine* June, 1931.

MINING

NITROGEN FIXATION IN JAPAN.—The Mitsui Mining Company and the Electro-Chemical Company of Japan have formed the Miike Nitrogen Industry Company, Ltd., with a capital of Y.10,000,000 for the purpose of manufacturing sulphate of ammonia by the Claude system. The new concern intends to make 30,000 tons of sulphate of ammonia yearly at the Miike coke works at Amuda, Kyushu, and at a plant in the suburbs of Yokosuka, near Yokohama. The capacity will ultimately be increased to 90,000 tons annually. The Miike works bought the Claude patent rights from Suzuki Shoten four years ago. Regular operations were due to start in August, and products may be marketed in September through the Mitsui Bussan Kaisha. Mitsui Bussan now has control of sales of British and German ammonium sulphate in the Japanese market, and also acts as sole sales agent for the Electro-Chemical, Japan Nitrogen, Hikoshima, Kamaishi and Miike interests.

GERMAN METAL CONSUMPTION.—The American Statistics Office for Metals has published an interesting review showing that the world production of metals in 1930 exceeded the consumption far more than was the case in 1929. The surplus was only reduced in the case of copper. Apparently, however, in this case the increased production from old materials has not been included. The following table shows the world production of the most important metals from 1928 to 1930, expressed in 1,000 of tons.

	production			Consumption		
	1928	1929	1930	1928	1929	1930
Copper	1,716	1,930	1,588	1,832	1,897	1,571
Lead	1,669	1,752	1,664	1,619	1,692	1,557
Zinc	1,422	1,470	1,411	1,567	1,621	1,555

The world production of tin, which increased from 179,000 tons in 1928 to 191,000 tons in 1929, declined once more in 1930 to 176,000 tons.

In 1930, Germany took the second place, after the United States, among the countries consuming metals. Her consumption of copper amounted to 11.8 per cent of the world production, of lead to 10.6 per cent, and of zinc to 14.2 per cent.

USSR STEEL PRODUCTION.—The production of 668,000 tons of high-grade steel is planned for the year 1932. This includes 462,000 tons of construction steel and 158,000 tons machine steel. The corporation "Electrostal" must increase its high-grade steel production from 45,000 tons to 120,000 tons a year.

TIN MINING IN JAPAN.—Anglo-Oriental Mining Corporation, Ltd., learns, on good authority, that the Japanese government has definitely approved the expenditure for the construction of a railway from Nobeoka to Hinokage. This means that the railroad will be brought within only 13 miles of Toyo mine. The survey, and the purchase of land, on the first section from Nobeoka to Okamoto (a distance of seven miles) has been completed, and it is proposed to commence construction on this first section in the immediate future. Committees of the leading villages have been formed for the purchase of land on the remaining sections, and many gangs of surveyors and linesmen have been observed completing the final surveys up to Hinokage. The completion of the first section to Okamoto will cut out about one-third of the distance between Hinokage and Nobeoka, and the approach of the railroad to Hinokage is therefore a matter of considerable importance to Toyo Tin, Ltd.; not only will it eliminate 25 miles of motor-truck haulage, but it should also lead to more favorable rail rates for the transportation of the mine concentrates.—*Mining World*.

RAILWAYS

NEW RUSSIAN RAILWAYS.—The Borovoye-Akmolinsk-Karaganda railroad, which is an extension of the line from Petropavlovsk, on the Trans-Siberian Railway, to Borovoye, was completed on September 1, two months ahead of schedule. The railroad is five hundred kilometers (315 miles) long and is part of the extensive plan for railroad construction in Kazakhstan, on which 80 million roubles (\$41,200,000) will be spent in 1932 alone. The new line will eventually be extended to the Turkestan-Siberian Railway, which connects the grain and lumber regions of Siberia with the cotton and non-ferrous metal mining districts of Central Asia.

The Bashkir railroad expected to complete the laying of the second track over a distance of 336 kilometers (210 miles) between Abdulino and Ufa, capital of the Bashkir Republic on September 15, one month ahead of schedule. This completes the double-tracking of the Samara-Cheliabinsk Railroad, which is of great importance, since it carries a large amount of freight for the Magnitogorsk steel mill in the Urals and the Kuznetsk mill in Siberia.

SECRET RAILWAY PROJECT.—Stimulated by the development of Persia, its neighbor, Afghanistan recently approached Japan in secret for the construction of a railway across that land and Japan's investment, but in view of the political effect upon other countries, the Railway Office has been carefully and secretly considering the request, it is learned.

According to the request, Afghanistan wants to construct its railway connecting between Yuletan in the southern part of Soviet Russia and Abdullah in Northern India via Harud and a few other cities, the distance being approximately 1,000 miles.

The building of the railway across that country involves many technical difficulties as it traverses the mountainous regions which are parts of the so-called Roof of the World.

The request, coupled with those of Soviet Russia and other lands, shows the international recognition of Japan's railway technique and the Railway Office is contemplating the plan with rather a favorable attitude. It seems, however, that the office is wavering because of the probable hitches it will encounter in point of Japan's investment in that land.—*Osaka Mainichi*.

RAILWAY PLANS LOAN.—Under the guarantee of the Daiki Railway Company, the Sangu Kyuko Electric Railway Company has decided to raise Y.10,000,000 loan shortly for which the Company will issue the debentures under the following terms:—

Total face value: Y.10,000,000

Interest: 5½ per cent.

Selling price: Y.99

Redemption: Within seven years.

No part of the issue will be placed on the market, the entire issue will be taken over by the 34th Bank and Mitsubishi Trust Company.

GIGANTIC CAR-BUILDING PLANT.—Preliminary work has been started on the construction of a large car-building plant in the vicinity of Tagi, with a productive capacity of 55,000 four-axle freight cars per year. The plant will turn out more railway cars per year than the production of all the existing car-shops in the Soviet Union put together.

The metallurgical base for the car-plant will be the new metal industries now being set up in Novo-Tagil. The car-building plant will begin operations by the first quarter of the year 1933.

RAILWAY ORDERS FROM CHINA.—The London Purchasing Commission of the Chinese Government have opened an office in London where they will deal with the disposal of the £3,500,000 representing part of Great Britain's share of the Boxer Indemnity Fund allocated to them. The greater part of this money will go to the purchase of British railway material for the Chinese railways, but the purchases will be spread over a considerable period as the duty of the Commission will be to deal with orders received from China. The British members of the Commission are Sir Basil Blackett, Sir Arthur Balfour, Sir Ralph Wedgwood, and Mr. W. T. Charter. Their first meeting was held a few weeks ago, but already

one order for railway material has been received from China amounting to £300,000, and to fill this will be the first work of the Commission. The material required for this order covers a wide range, from a locomotive to a school. It is expected that the orders will include locomotives, passenger and freight vehicles, and a considerable quantity of steel rails and steel for bridges. Dr. Ching Chun Wang is the Director of the London office, which is in the building of the Federation of British Industries in Tothill-street, Westminster.—*Times Trade Supplement.*

TRADE AND FINANCE

SILVER PROBLEM.—An important conference is being called for September 22, in London, by the China Association to consider the situation which has arisen as a result of the fall in the price of silver. Leading men in commerce and in the mining industry will be present, the latter including Mr. W. Pellew Harvey, president of the Institution of Mining and Metallurgy. The conference will be presided over by Sir Robert Horne. In considering this subject it is important to remember that the purchasing power of countries in the East is seriously affected by the loss of credit that has resulted from depreciation in the value of savings which are in the form of silver metal, as was emphasized in the *Magazine* in February last. Base metal mining would also, of course, be given a considerable helping hand if the price of silver were stabilized at a higher price than at present.

CHINESE MACHINERY MARKET.—In the course of a recent report upon the trade situation at Shanghai, the Commercial Counsellor in that city states that there are many inquiries in the machinery market, but difficulties almost invariably arise with regard to the terms of payment. The high cost of machinery owing to the unfavor-

able exchange has led to the postponement of a good many projects. There can, however, be no doubt that the industrial development of China is making steady progress and if political conditions remain reasonably stable the demand for machinery should expand very rapidly.

"A noteworthy feature in the machinery business has been the strong efforts now being made by Japanese manufacturers to compete not only for the low-quality trade in which they have long been formidable, but also for the supply of equipment of a better type. There have, for example, been recent instances in which substantial orders for electrical supplies have been placed in Japan by the Shanghai Power Co., and whilst the Japanese tenders have been in some cases less than half those quoted by American and Continental manufacturers one is entitled to assume that they would not have been accepted unless they were fully in accordance with the specifications. It is difficult to believe that such contracts can be remunerative, but they are at least evidence of the determination of the Japanese machinery manufacturers to establish their position in the market."—*Electrical Review.*

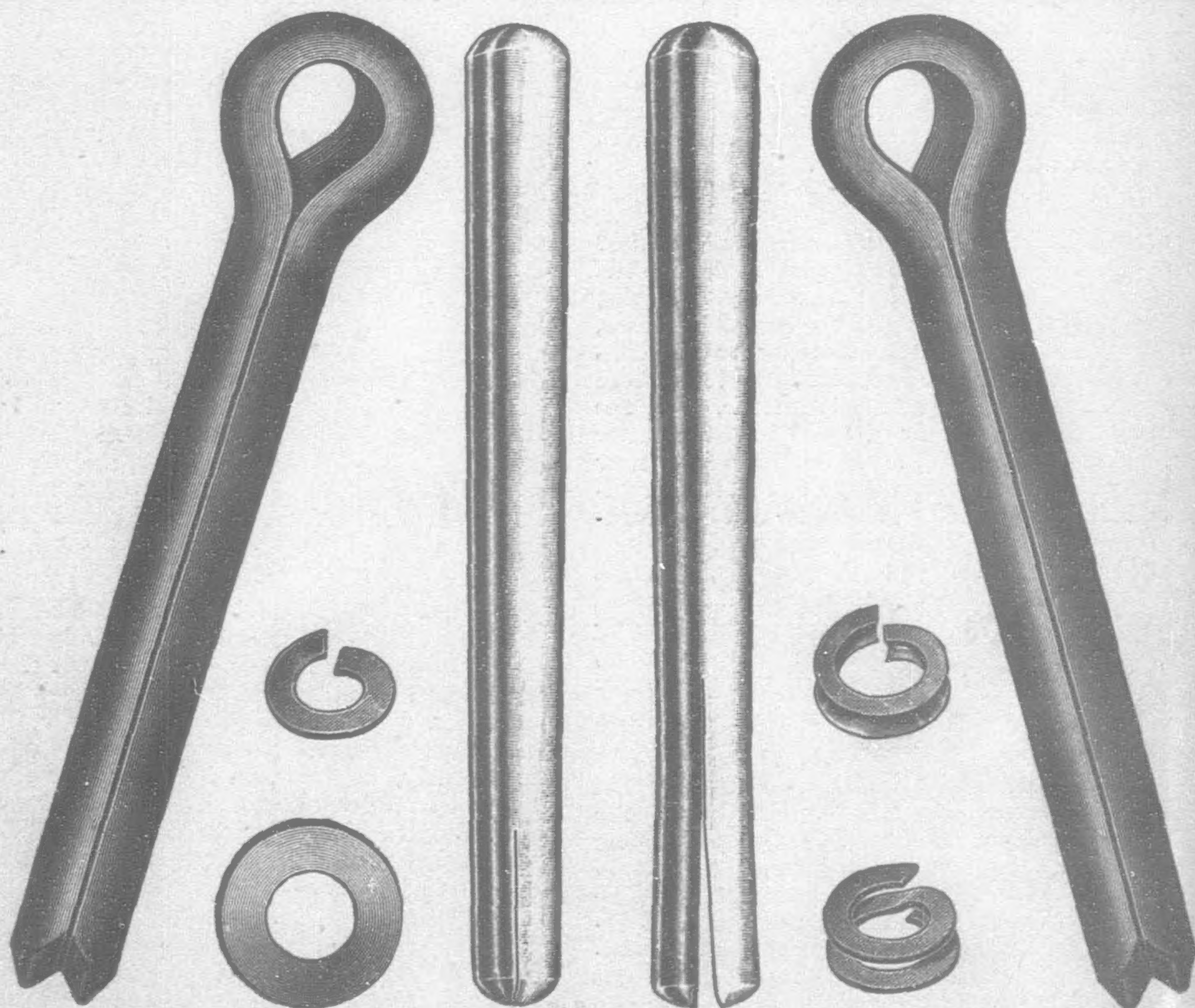
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